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TRANSIENT RESPONSE OF A LAYERED, SLOPING SOIL TO NATURAL RAINFALL IN THE PRESENCE OF A SHALLOW WATER TABLE: EXPERIMENTAL RESULTS

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ACKNOWLEDGMENTS

The authors wish to acknowledge the contributions of Franklin Artz and Richard Savidge in collecting data during the 1969 and 1970 seasons.

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TRANSIENT RESPONSE OF A LAYERED, SLOPING SOIL TO NATURAL RAINFALL IN THE PRESENCE OF A SHALLOW WATER TABLE: EXPERIMENTAL RESULTS

By A.S. Rogowski, E.T. Engman, and E.L. Jacoby, Jr.[2]

INTRODUCTION

The role of the soil in distributing precipitation to runoff, storage, and groundwater is the single greatest unknown in hydrology. Knowledge of the other phases, such as flood routing, analysis of surface runoff, and precipitation variations, often appears more advanced than the studies dealing with water movement within field profiles. Although the theory of the unsaturated flow (*3*)[3] and numerical simulation techniques (*2*) are quite advanced, applications to the actual field situations are largely nonexistent. As a result, the methodology for dealing with soil water movement on watersheds is not available, and the pertinent data are lacking. The study described here represents an attempt to provide the necessary data and to develop a general methodology in this field.

OBJECTIVES

This paper will describe in detail the experiment carried out during the summers of 1969 and 1970 at Pauls' farm near Klingerstown, Pa. The purpose of the study was: (1) To determine soil water flux in a layered, sloping soil under natural field conditions, (2) to develop practical methodology for soil water flux studies on the large watershed areas, and (3) to interpret the results in terms of watershed performance. Here we will be concerned principally with reporting the results.

EXPERIMENTAL AREA

Location

The study area (fig. 1) was located on the Mahantango Creek Experimental Watershed in the ridge and valley region of east-central Pennsylvania. This watershed has been described previously (*4*). The area is characterized by long mountain ridges with local relief of about 200 meters from valley floors to ridge tops. The ridges consist of sandstone, while interbedded shales and siltstones make up the slope and valley material. At the experimental site (fig. 1), the angle of dip in the rock strata is about 30 degrees on both sides of the stream. Detailed description of the watershed geology exists (*1*). The evidence presented (*1*) and the visual inspection of the watershed suggested that the principal zones of soil water concentration lie along the abundant fracture traces (*9*). The experiment described here was located along one of these zones on the north side of the stream.

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[1]Contributed by the Northeast Watershed Research Center, Agricultural Research Service, University Park, Pa., in cooperation with the Agricultural Experiment Station, The Pennsylvania State University, University Park, Pa.

[2]Soil scientist, supervisory research hydraulic engineer, and hydrologic technician, respectively, Northeastern Region, Agricultural Research Service.

[3]Italic numbers in parentheses refer to Literature Cited, page 20.

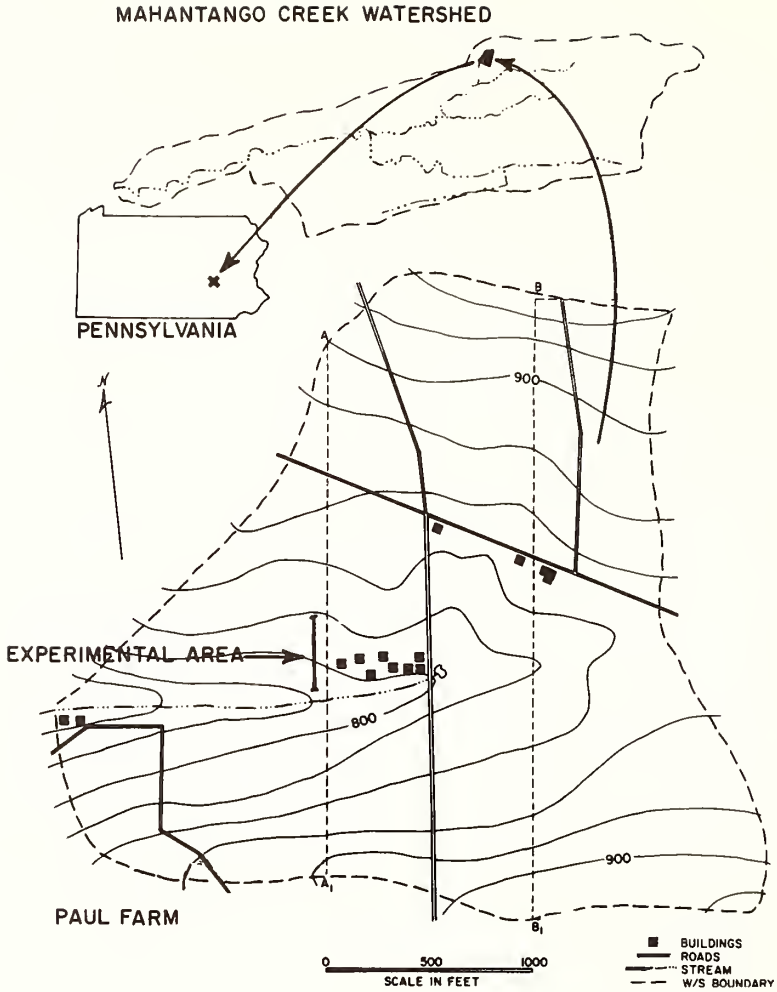


Figure 1.— Location of the experimental area.

Soils

Fracture traces on the watershed commonly occur in depressions oriented at right angles to the stream network with doncave foot slopes, layered, well-developed soil profiles, and moderate slope gradients from 8 to 15 percent. Shallow, steep soils surround such areas, and deeper soils can be found beyond on more gentle slopes (fig. 2).

A 150-meter-long, 8-percent slope segment of a fracture trace was chosen for detailed study. In the area selected, the principal soil series, Albrights silt loam (Appendix 1) has a horizon of clay accumulation (B_t) above a fragipan (B_x), and a sod cover with a well-developed root system within the top 30 centimeters of the soil surface. Surrounding soils are shown in figure 2, and their general properties are given in table 1.

Slope

Figure 3 illustrates the slope measurements at the experimental site (actual elevations are given in Appendix 2). The length of the subsegments into which a 100-meter-long experimental slope segment was subdivided is shown in the insert. As their lengths decreased, local variability of the slope became evident. This variability associated with the slope at right angles to contour lines at 1-meter intervals can be used to estimate surface detention and storage on a watershed. The procedure is illustrated in figure 4.

The percent slope is plotted on a normal probability paper against its cumulative frequency. The probability of the negative slope (detention), as well as the frequencies associated with a predominant slope in the area, can be read off directly from the figure.

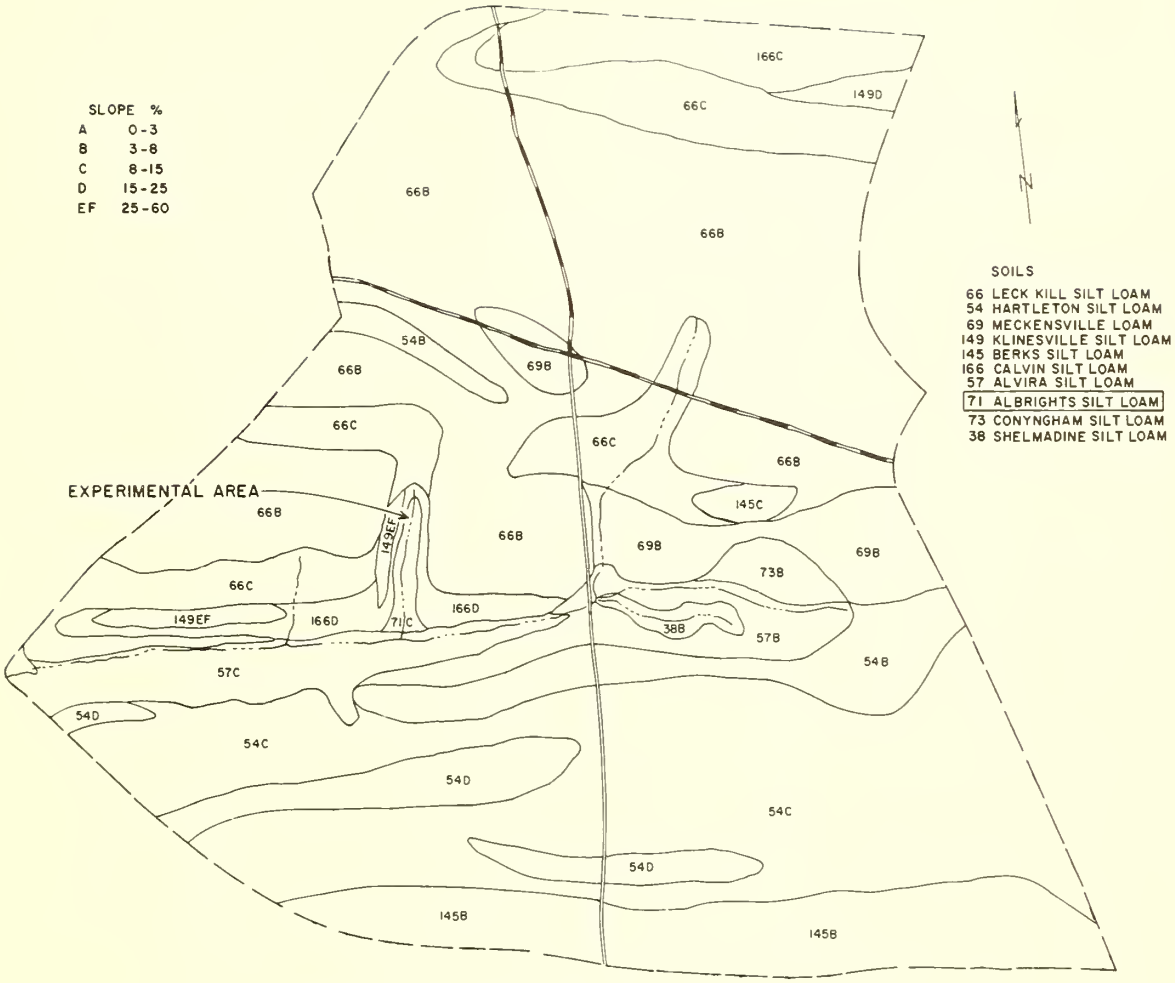


Figure 2.— Distribution of soils in the experimental area.

TABLE 1.–Texture, classification, depth, relative conductivity (K)[1], soil water[2] at 15 bars (Θ_{15}) and air entry (Θ_e)[3], depth of an abundant root zone, for soils of the intensive study area

No.	Soil name	Percent	Texture	Classification	Topsoil		Subsoil	Substratum		Soil water		Roots
					Depth	K	K	Depth	K	Θ_{15}	Θ_e	
					(cm)			*(cm)*		*(cm³)/(cm³)*		*(cm)*
66	Leck Kill	40	Channery silt loam	Typic hapludult	< 20	0.60	1.00	> 71	1.00	0.121	0.295	38
54	Hartleton	31	..... do	..... do	< 25	.60	.40	> 76	.40	.130	.335	25
149	Klinesville	2	..... do	Lithic dystrochrept	< 15	1.00	1.00	> 46	–			40
145	Berks	9	..... do	Typic dystrochrept	< 23	1.00	1.00	> 64	1.00	.108	.376	25
166	Calvin	5	..... do	..... do	< 23	.60	1.00	> 46	1.00			56
69	Meckensville	4	..... do	Typic fragiudult	< 23	.40	.10	> 61	.40	.177	.311	38
57	Alvira	6	..... do	Aquic fragiaqualf	< 25	.40	.10	> 76	.03	.150	.304	25
71	Albrights	.5	..... do	Aquic fragiudalf	< 23	.40	.10	> 51	.10	.131	.342	30
73	Conyngham	1	..... do	Aeric fragiaqualf	< 23	.40	.40	> 76	.03	.172	.318	30
38	Shelmadine	.5	..... do	Typic fragiaquult	< 25	.10	.03	> 76	.20	.154	.353	25

[1] K = 1.00 = 107 cm/day.
[2] Estimated from the unpublished experimental data of E. Rawitz, Soil Surveys of Fulton and Columbia Counties, Pa.
[3] Θ_e estimated as 0.8 Θ_o, where Θ_o is equal to pore space.

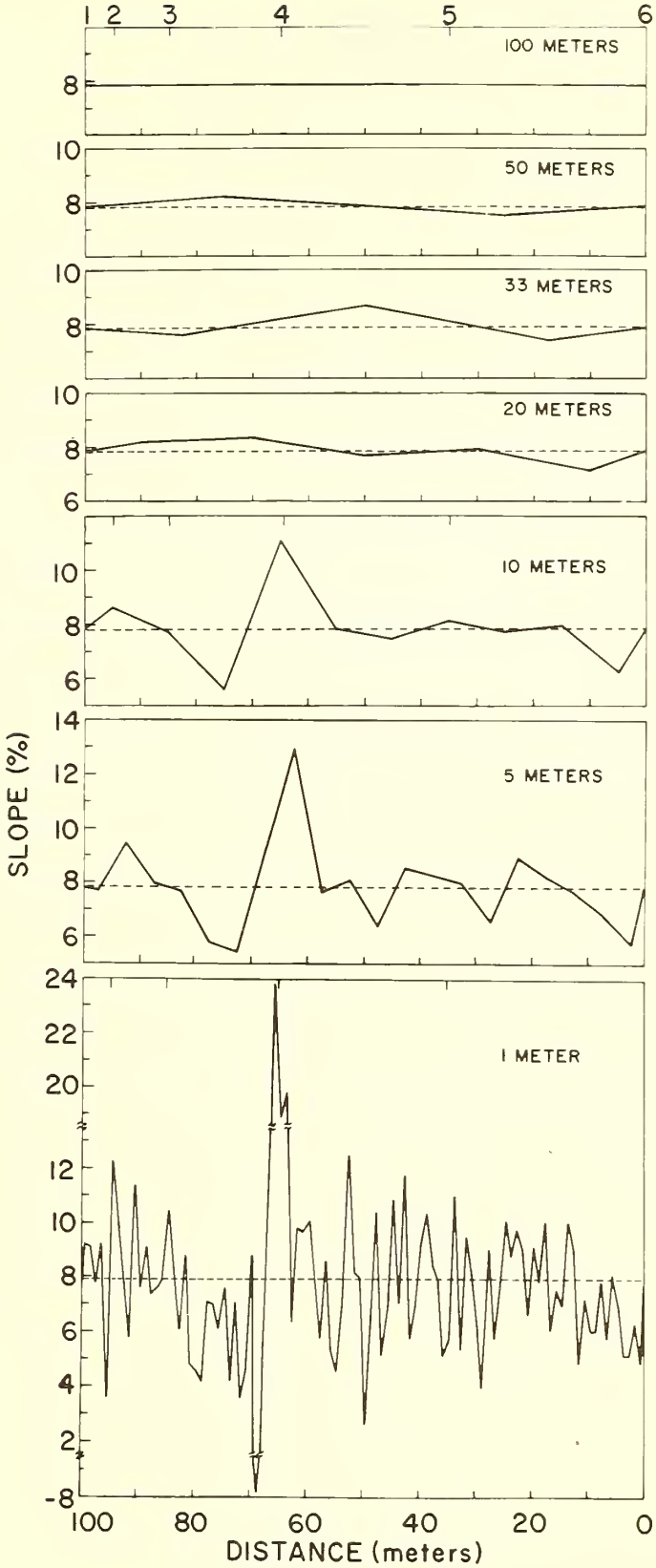


Figure 3.— Slope, as calculated for different subsegments (inserts) of a 100-meter-long experimental area. The numbers on the top indicate location of measuring sites during 1969 season.

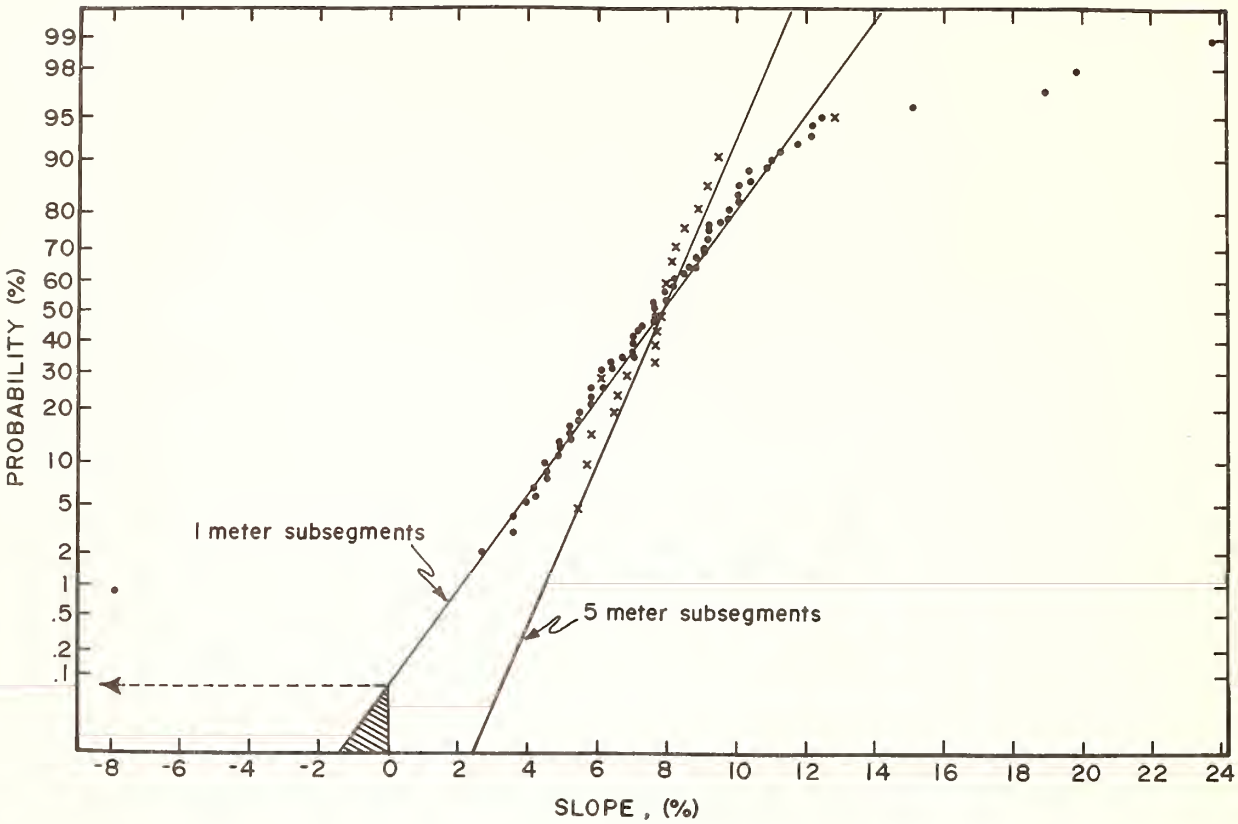


Figure 4.— Normal probability plot of slopes that occurred in a 100-meter experimental segment, based on (a), 1-meter subsegments (b), 5-meter subsegments.

Instrumentation

General

Figure 5 shows the instrumentation of the experimental area, and table 2 lists the appropriate coordinates. There are I-sites (I = 1, . . . 6) and K-depths (K = 1, . . . 6). Relative position of the water table, surface topography, B_t (clay) horizon, and the boundary between Conyngham and Albrights soils are also given. Figure 6 illustrates the instrumentation of each site (S) and shows the profile sampling points for soil water and soil water pressure measurements. The four tensiometers (in fig. 6.1) were installed (from left to right) at the depths: K = 1, K = 3, K = 4, respectively (fig. 6.2). Elevations above the bench mark at each K-sampling point are given in table 3.

Rain Catch

The rain catch device, consisting of a funnel and a bottle during the first year and the 8-inch-diameter top of a nonrecording rain gage and a can during the second year was installed at each site. The relationship between the rain catch and the recording rain gages (R-1 and 2 in fig. 5) is shown in figure 7.

The data and the associated degree of rainfall variability along the slope are given in Appendix 3.

Microlysimeters

Predominant rooting depth on Albrights silt loam meadow was 30 centimeters. Specifically designed microlysimeters (fig. 8) were installed at each site to measure the evapotranspiration component of flow at the soil surface.

Microlysimeters were made of the poly-vinyl-chloride (PVC) tubing. This material was chosen because of its lightness, desirable thermal properties, inertness, ease of workmanship, and low price. Installation was accomplished by trimming around the base of the cutting edge and gently forcing the PVC tubing over the undisturbed soil monolith (fig. 8).

When the desired depth had been attained, the assembly was removed, and the lower end was trimmed, covered with heavy burlap, and the PVC

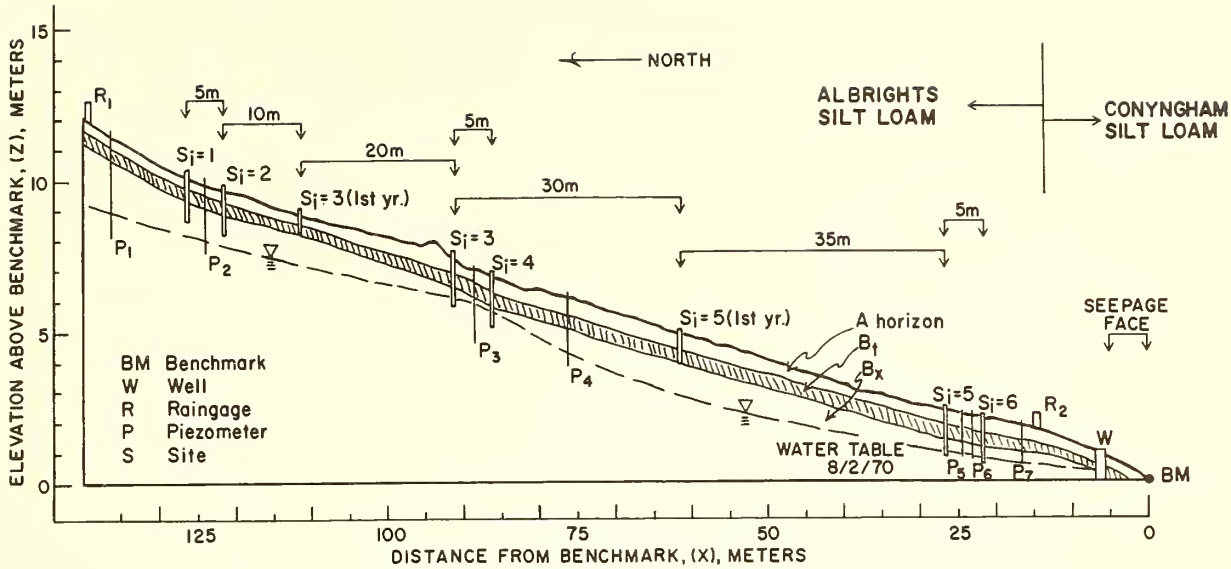


Figure 5.— Instrumentation of the experimental area.

TABLE 2.–Instrumentation coordinates at the experimental site on Albrights silt loam in 1969 and 1970

Instrumentation		X[1]	Z_o	Soil horizons[2]	
Type	Number			B_t	B_x
		cm	*cm*	*cm*	*cm*
Bench mark		0	0		
Rain gage	1	13,971	1,210		
	2	1,480	170		
Piezometer	1	13,630	1,159		
	2	12,380	993		
	3	8,880	711		
	4	7,630	615		
	5	2,430	229		
	6	2,330	221		
	7	1,630	183		
Site (1st year)	1	12,630	1,018	41	76
	2	12,130	985	51	76
	3	11,130	893	43	69
	4	9,130	753	53	97
	5	6,130	495	56	97
	6	2,630	245	48	99
Site (2nd year)	1	12,630	1,018		
	2	12,130	985		
	3	9,130	753		
	4	8,630	683		
	5	2,630	245		
	6	2,130	213		
Conyngham soil		1,311	159	36	61
Shallow well		631	89		

[1] As measured along the sloping surface (7.8°); to convert to rectangular coordinate, multiply by 0.99075.
[2] Depth below surface at Z_o.

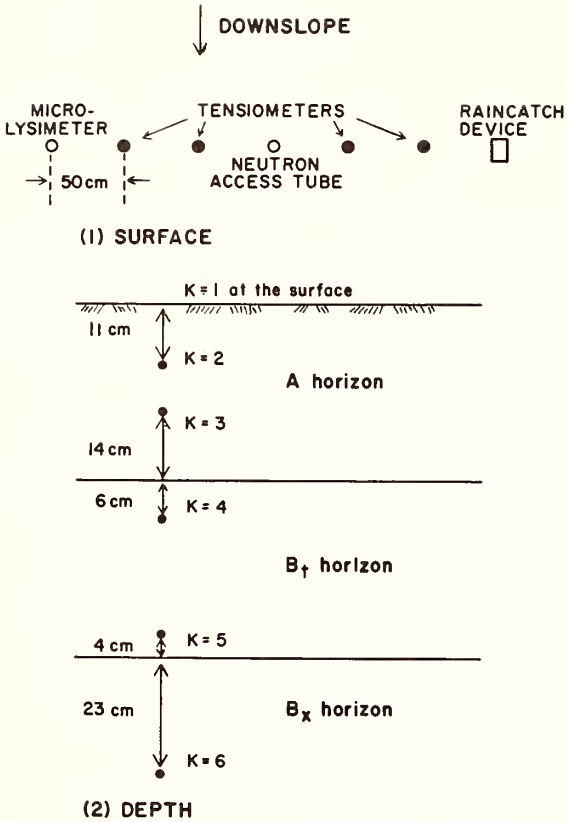


Figure 6.— Instrumentation at each site.

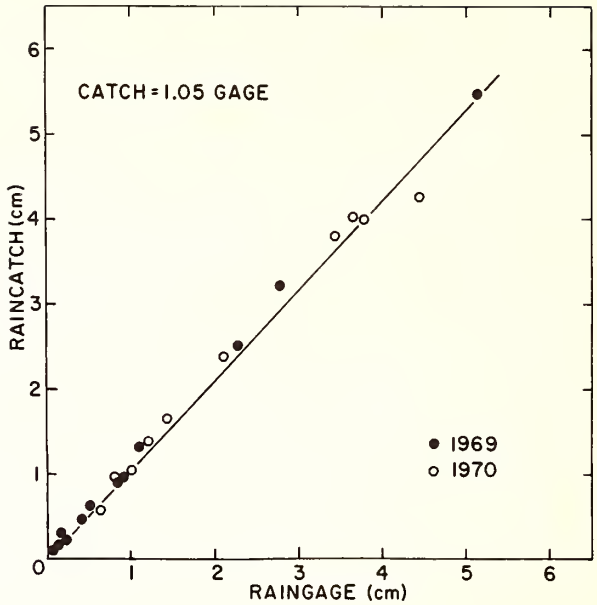


Figure 7.— Relationship between the rain catch and the recording gages at the experimental site.

TABLE 3.–Elevations above the bench mark of the points within the profile of Albrights silt loam at which water content and pressure measurements were made

Depths I	Sites 1	2	3	4	5	6
K			(cm)			
1969						
Surface	1,018	985	893	753	495	245
2	1,007	974	882	742	484	234
3	991	948	864	714	453	211
4	971	928	844	694	433	191
5	946	913	828	660	402	150
1970						
Surface	1,018	985	753	683	245	213
2	1,007	974	742	672	234	202
3	991	948	714	644	211	179
4	971	928	694	624	191	159
5	946	913	660	590	150	119
6	919	886	633	563	123	91

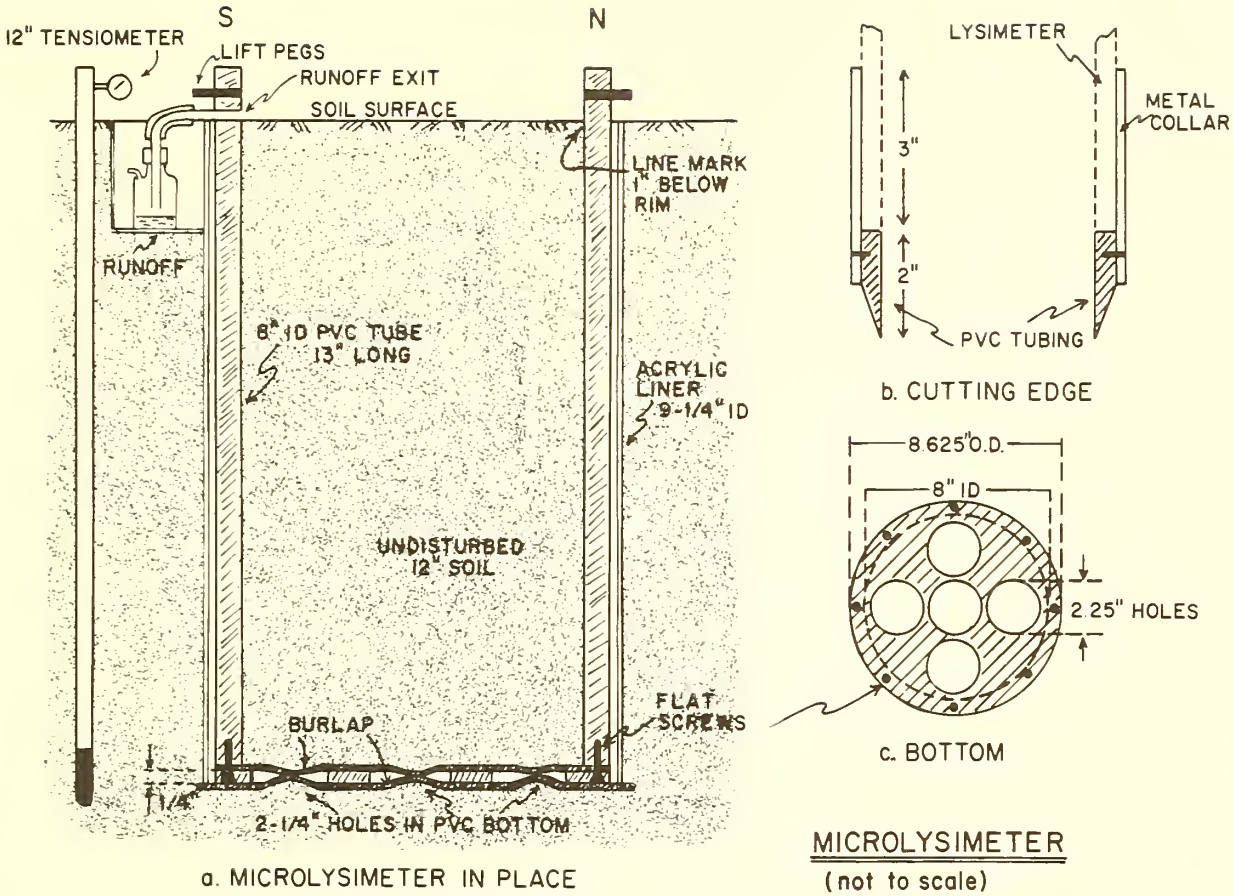


Figure 8.— Schematic diagram of (a), the lysimeter in place; (b), the cutting edge used during installation; and (c), the bottom cross section.

bottom (fig. 8) attached. The loose soil at the bottom of the access hole was also covered with burlap. A thin-walled acrylic liner (fig. 8a) was inserted, and a hole filled around it. When the lysimeter settled in the acrylic-lined access hole, contact was established between the bottom and the subsoil. To insure adequate contact, microlysimeters were always returned to the same position in the access hole. The microlysimeters described here (fig. 8) weighed about 3 kg empty and about 20 kg full. A portable 48-kg capacity scale with a windshield was used to weigh the microlysimeters to the nearest 5 g at the same time that other measurements were taken at the site.

Shallow Well

The experiment was sampled every 2 days, except when interrupted by rain. At the same time, continuous records of the rainfall and the shallow water table fluctuations were made. A 91-cm-deep well, situated at the head of the seepage face (fig. 5) and equipped with an automatic float recorder, was specifically designed for the latter purpose. This well consisted of a 15-cm-diameter piece of perforated metal tubing surrounded by gravel and sealed at the ground level. The response to the fluctuations of groundwater was remarkably fast at this measuring point.

Standardization

Soil Water

Figure 9 shows two calibration curves for the depth-moisture probe. The dashed line is for Albrights silt loam of 1.3 g/cm^3 average density; the solid line is for the 1.7 g/cm^3 material. Calibration was carried out in the field using gamma density probe and gravimetric sampling for soil water. The

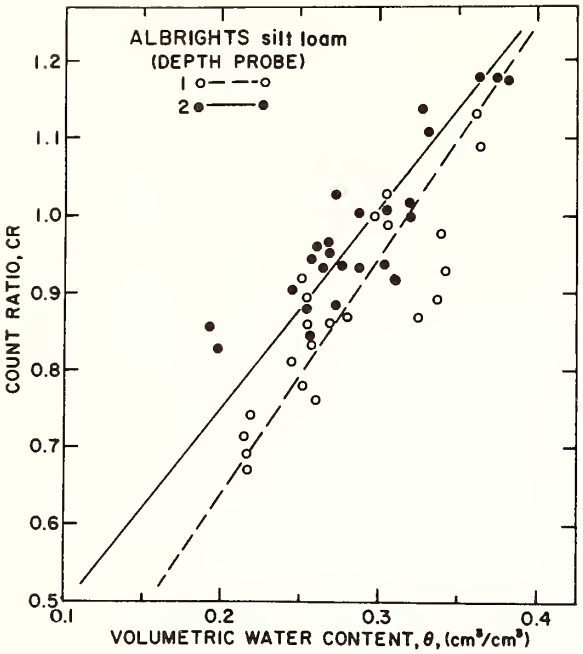


Figure 9.— Field calibration curves for the neutron scatter depth moisture probe on Albrights silt loam: (1) average soil density of 1.3 g/cm³, (2) average soil density of 1.7 g/cm³.

regression lines represent the best fit, and their equations may be written

$$\Theta_{v1.3} = 0.3286\ CR - 0.0097 \qquad (1)$$

$$\Theta_{v1.7} = 0.3854\ CR - 0.0895 \qquad (2)$$

where the count ratio (CR) has the usual meaning. For the surface probe, previous calibration by E. Rawitz[4] was used, and the pertinent regression equation is

$$\Theta_{v\,surf.} = 1.3463\ CR - 0.6755. \qquad (3)$$

Soil Moisture Characteristics

Soil moisture characteristic for the A and B_t horizons of Albrights silt loam is shown in figure 10, and the input parameters to the model (*5*) are given in the insert.

The experimental data points were obtained from the tensiometer and moisture probe readings in the

[4]Formerly of the Northeast Watershed Research Center, University Park, Pa.

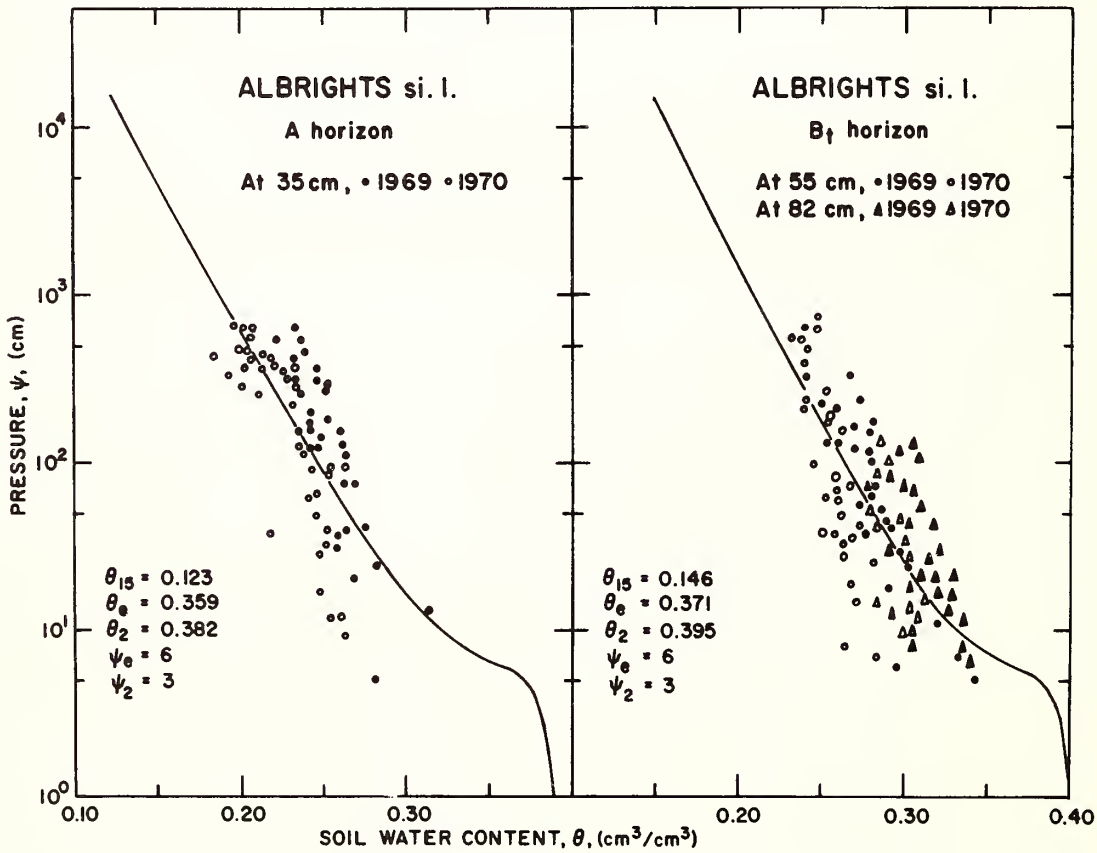


Figure 10.—Soil moisture characteristic of Albrights silt loam (model) and the field data points.

field. They are listed as sampled at specific average depths below the soil surface.

Hydraulic Conductivity

Figure 11 shows the hydraulic conductivity for three horizons of Albrights silt loam as a function of soil water content and pressure. Respective moisture characteristics and average values of conductivity (K_e) at air entry are shwon in the insert. The hydraulic conductivity curves were obtained using the model outlined previously (*7*).

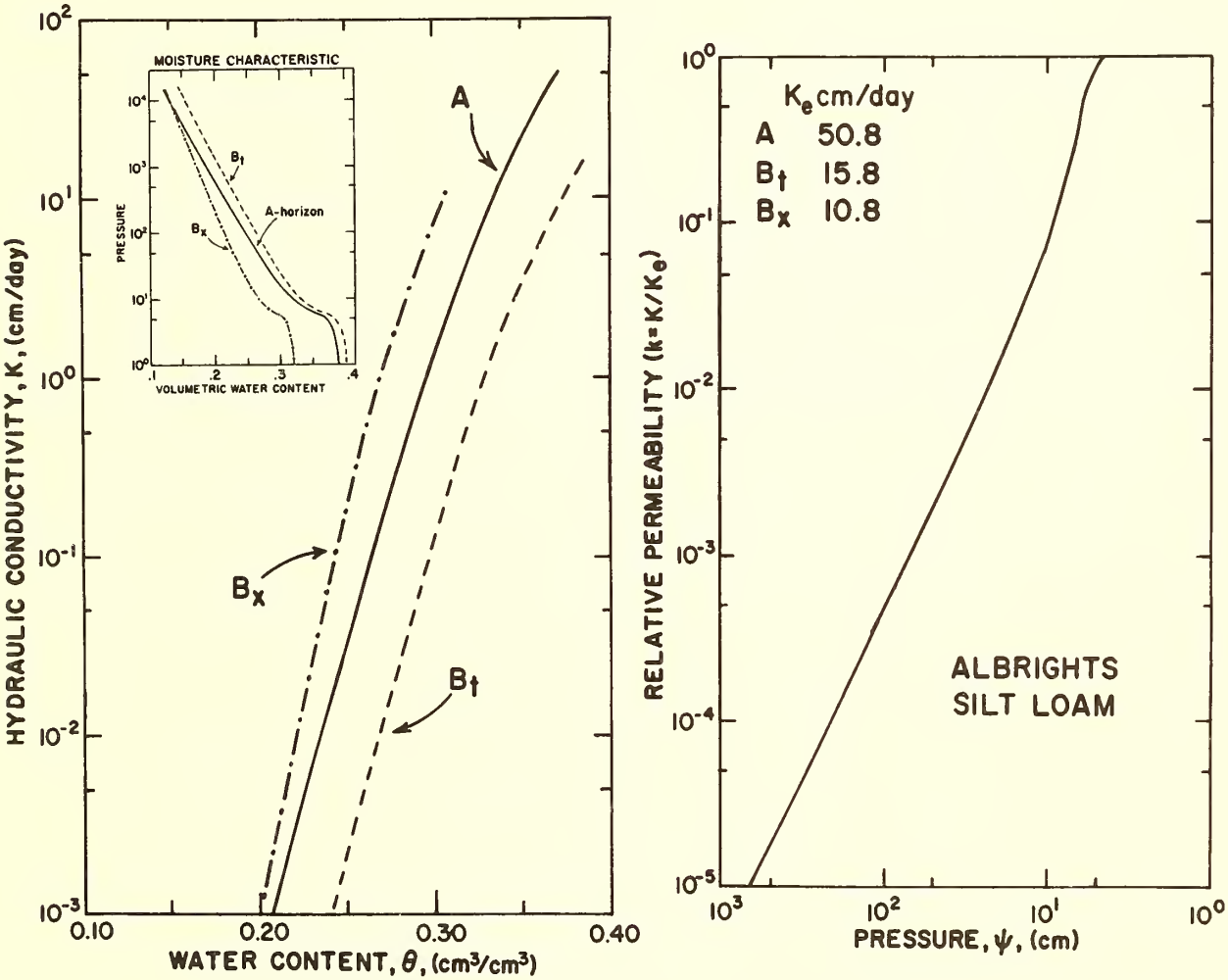


Figure 11.—Hydraulic conductivity of Albrights silt loam; the inserts show the moisture characteristics and the values of conductivity at air entry (K_e).

EXPERIMENTAL RESULTS

Rainfall

Figure 12 shows the rainfall distribution during the summer and fall of 1969, and figure 13 contains the same information for 1970. The numbers above the bars represent rainfall durations in minutes. The lower parts of the figures show the times of occurrence, amounts, and durations for the individual storms. The upper parts of figures 12 and 13 represent totals and averages. Detailed results are given in Appendix 3.

Water Table

Figure 14 shows the position of the water table piezometers and the shallow well (SW) relative to the bench mark and topography of the experimental site.

In figures 15 and 16, piezometer response to the rainfall in 1969 and 1970 is shown for selected piezometers, and in figure 17, shallow well response is given. Additional detailed data are given in Appendix 4. The plus signs (+) in figures 15, 16, and 17 represent sampling times.

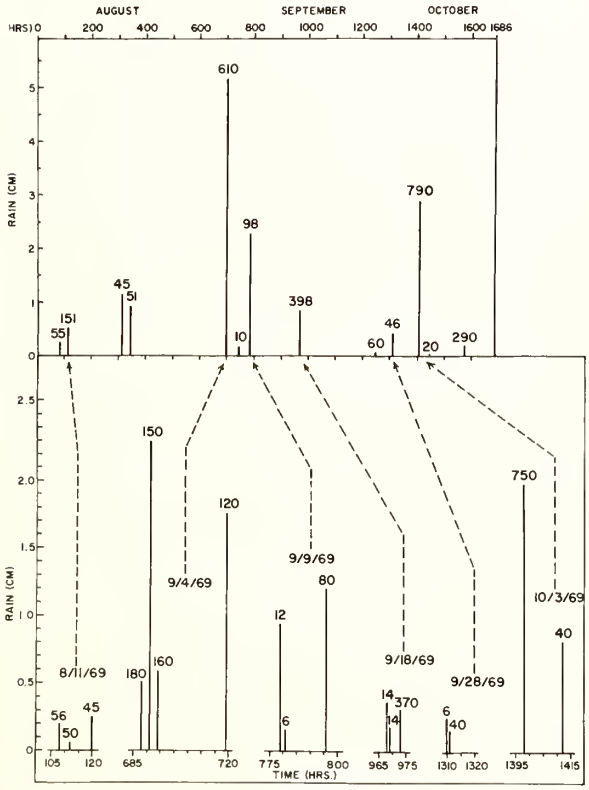


Figure 12.—Rainfall: time of occurrence, amount, and duration in minutes (above bars) for 1969 study period; upper part of the figure shows totals.

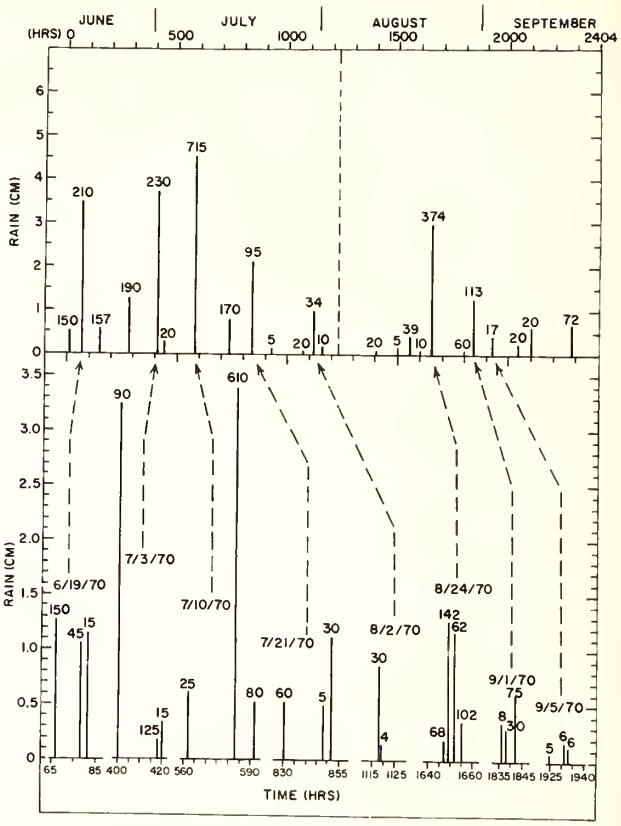


Figure 13.—Rainfall: time of occurrence, amount, and duration in minutes (above bars) for 1970 study period; upper part of the figure shows totals.

Evapotranspiration

Figure 18 gives the cumulative loss of water from microlysimeters as a function of the square root of time. In figure 18.1, regression curves for the three sets of data are shown together, and in figures 18.2, 18.3, and 18.4, they are given separately along with the experimental points for different sites (fig. 5). Respective regression equations are also shown. These data have not been corrected for the bottom flux. Detailed results are given in Appendix 5.

Soil Water and Soil Water Pressure

Figure 19 shows the average sampling depths in the Albrights silt loam profile, and figures 20 through 23 list the distributions of soil water and soil water pressure with time at each of the above sampling depths during 1969 and 1970. The plus signs (+) represent sampling times. Detailed data on soil water pressure are given in Appendix 7.

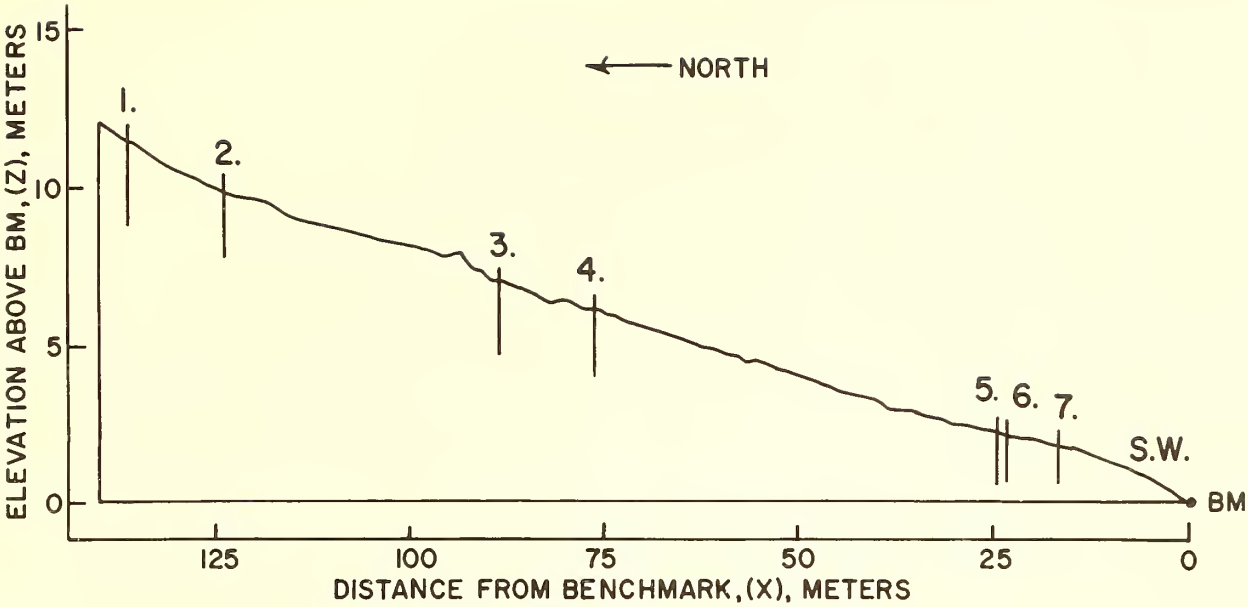
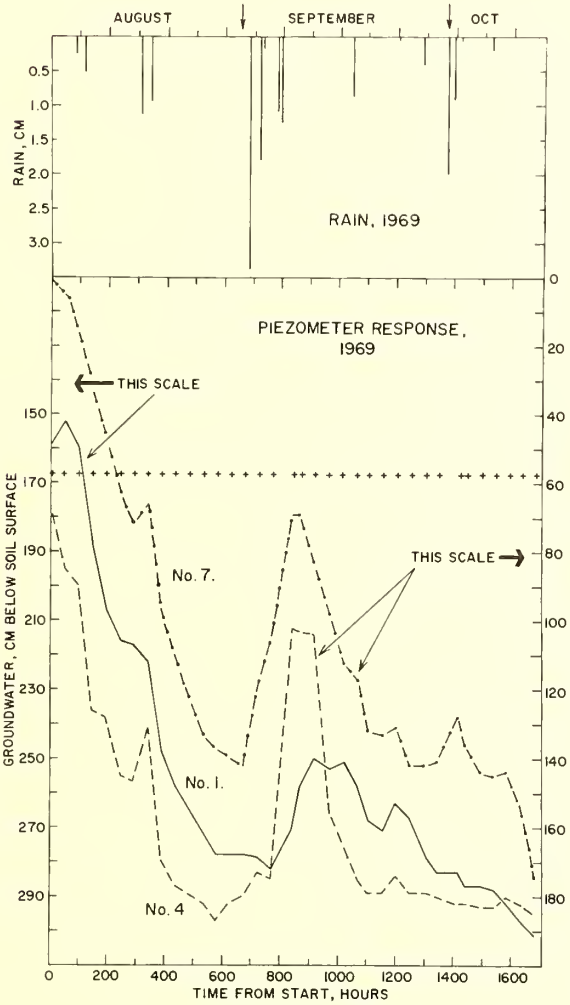


Figure 14.—Position of water table piezometers and shallow well relative to the bench mark.



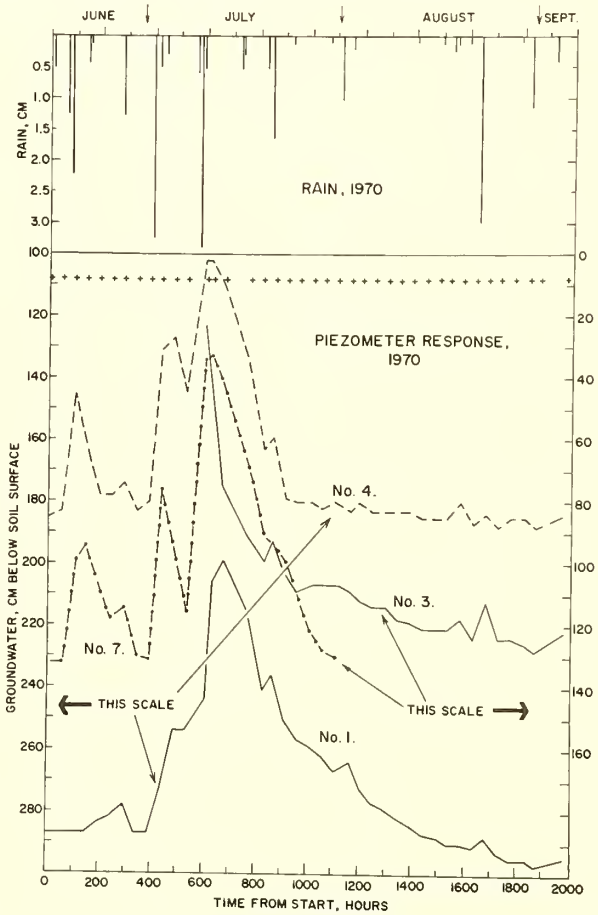


Figure 16.—Piezometer response to rainfall, 1970.

Figure 15.—Piezometer response to rainfall, 1969.

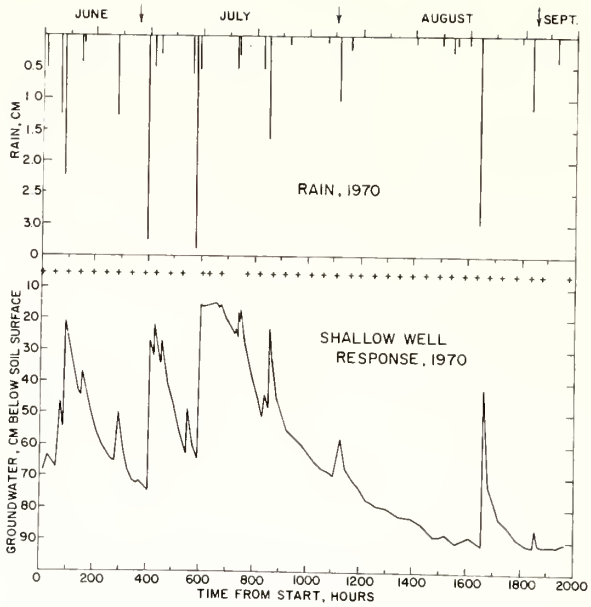


Figure 17.—Shallow well response to rainfall, 1970.

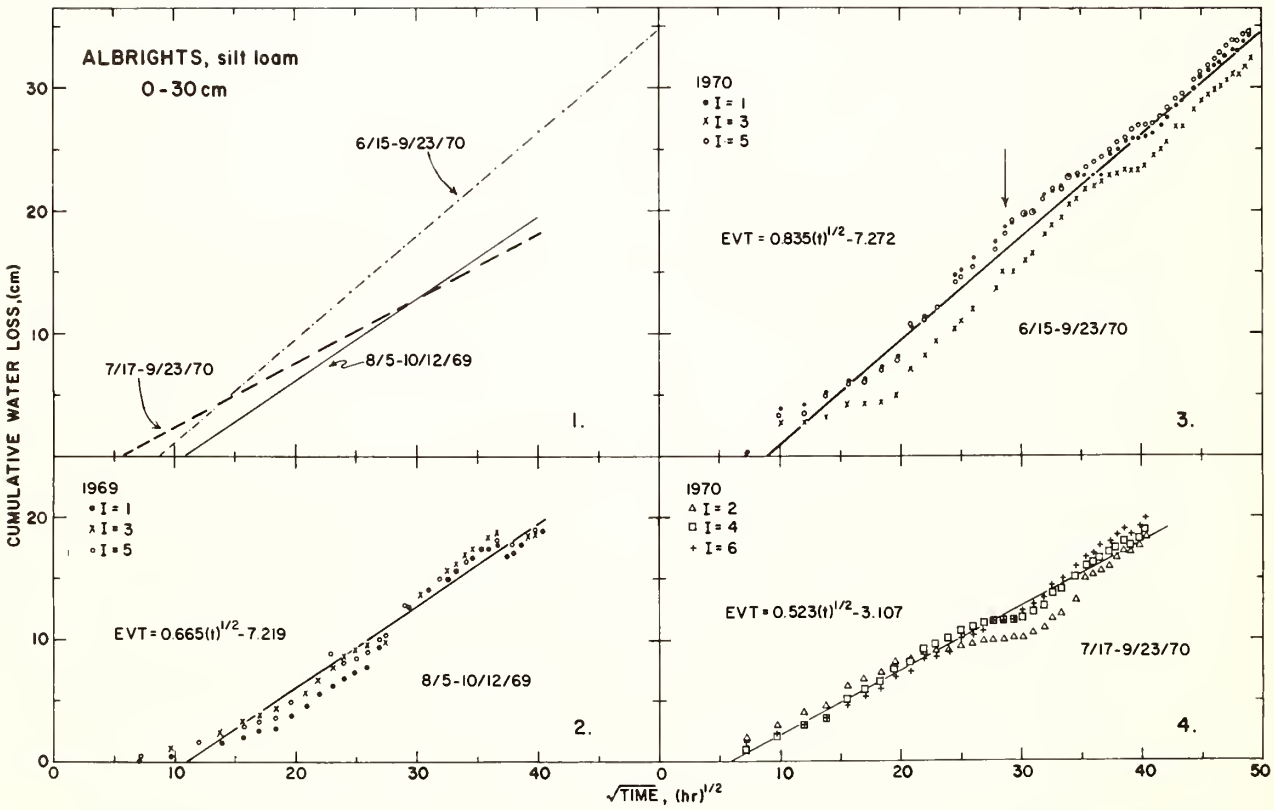


Figure 18.—Evapotranspiration on Albrights silt loam as a function of the square root of time.

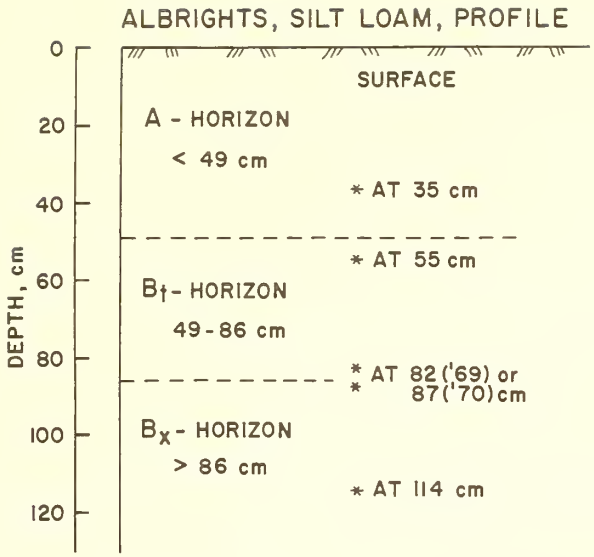


Figure 19.—Average sampling depths in the Albrights silt loam profile.

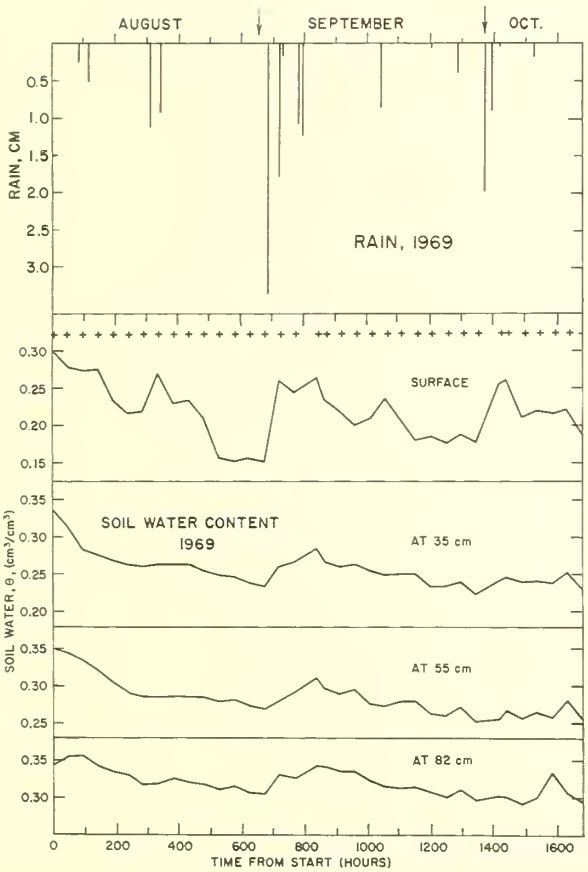


Figure 20.—Distribution of soil water with time at the surface and three sampling depths during the 1969 season.

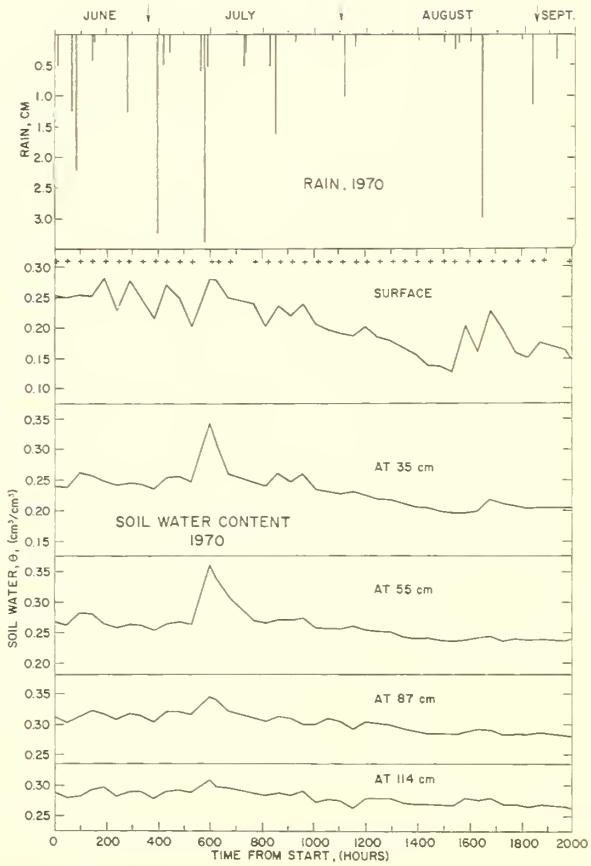


Figure 21.—Distribution of soil water with time at the surface and four other sampling depths during the 1970 season.

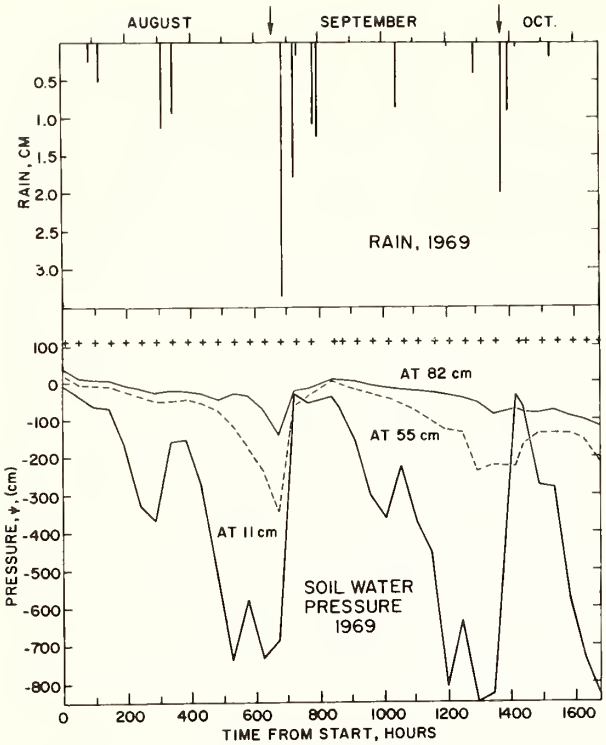


Figure 22.—Distribution of soil water pressure with time at three sampling depths during the 1969 season.

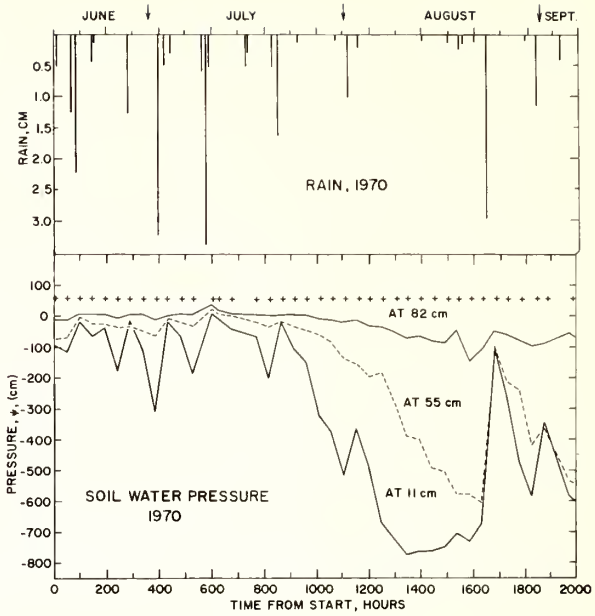


Figure 23.—Distribution of soil water pressure with time at three sampling depths during the 1970 season.

VARIABILITY

Some variability criteria for field soils have already been suggested (*6*). Coefficient of variation less than 15 percent was considered acceptable for the soil water content at 15 bars and at air entry. At the same time, it was suggested that the antilog of the logarithmic standard deviation for hydraulic conductivity at air entry be equal to or less than 2.0.

Table 4 shows the results when the same criteria were applied to the volumetric water content at five depths (normal distribution) and to the soil water pressure (lognormal distribution) at four depths. Because of the high degree of variability as $\Psi \rightarrow 0$, these values were considered separately. High degree of variability for the water pressure at the depth K = 5 reflects relatively high water content at that depth (figures 20 and 21). High degree of variability in the surface water content is complemented by the fluctuations of the soil water content with time.

TABLE 4.—Variability of soil water content and soil water pressure in Albrights silt loam in 1969 and 1970[1]

Depth K	Degree of variation	
	1969	1970
	Average coefficient of variation for the volumetric water content	
	Percent	*Percent*
Surface	[2] 18.8 (36)	15.8 (47)
3	11.5 (36)	12.4 (47)
4	10.0 (36)	10.1 (47)
5	10.5 (36)	12.8 (47)
6	---	14.9 (47)
	Average antilogarithm of $S/_L$[3] for the water pressure[4] *(4)*	
	(cm)	*(cm)*
2	1.65 (35)	1.50 (41)
3	1.72 (31)	1.82 (42)
4	1.98 (29)	2.06 (39)
5	5.17 (23)	3.19 (22)
$\overline{\Psi} \geq$ - 20 cm	4.09 (26)	5.44 (43)

[1] See Rogowski (1972).
[2] Values in brackets represent the number averaged.
[3] S_L = logarithmic standard deviation.
[4] For values less than -20 cm.

ASSESSMENT OF METHODOLOGY

The data in figure 24 and table 1 for Albrights and Conyngham silt loams show them to be reasonably representative of the bottom lands on this watershed. Because the experimental area is located in the natural flow pathway, we would expect the experimental results to have a direct bearing on the flow in the stream that drains the area. Figure 25 shows such a comparison. The time scale is the same as in figures 15, 20, and 22, and the curves for groundwater level, soil water, and soil water pressure, taken from the above figures, are compared with the head fluctuations at the weir. The rainfall amounts are indicated in the top part of the figure. The weir was located at the lower end of the watershed shown in figure 1.

Results indicate that runoff originates considerably faster in response to rainfall than either the changes in groundwater level or the changes in the soil water and the soil water pressure in the study area. Shallow well behavior (fig. 17) in 1970 provided a response to rainfall almost as fast as the response of the stream weir in 1969. The studies also indicate that the general trend of the well and weir data is closely related to soil water content, soil water pressure, and piezometric fluctuation. However, because of their fast transitory nature, the extreme peaks may well typify local response of the soil material close to the streambed or close to the shallow well.

The study has shown that there is little change in the soil water and soil water pressure below 55 cm on Albrights silt loam. Most changes occur in the surface layer. Consequently, the response of the microlysimeters, fluctuations and distribution of the soil water content, and pressure within the topsoil are of considerable interest.

The study has also shown that economy of space and time can be affected if the watershed instrumentation is carried out strictly on the "pedon" basis. A "pedon" is the smallest unit of soil that includes the range of horizon variability associated with a given soil (*10*). The experimental area studied essentially consisted of two pedons.

In addition, the field data appear to substantiate the moisture characteristic model previously developed (*5*). Soil information available (table 1) appears sufficient for computation of the unsaturated conductivities on a watershed basis (*6, 7,* and *8*).

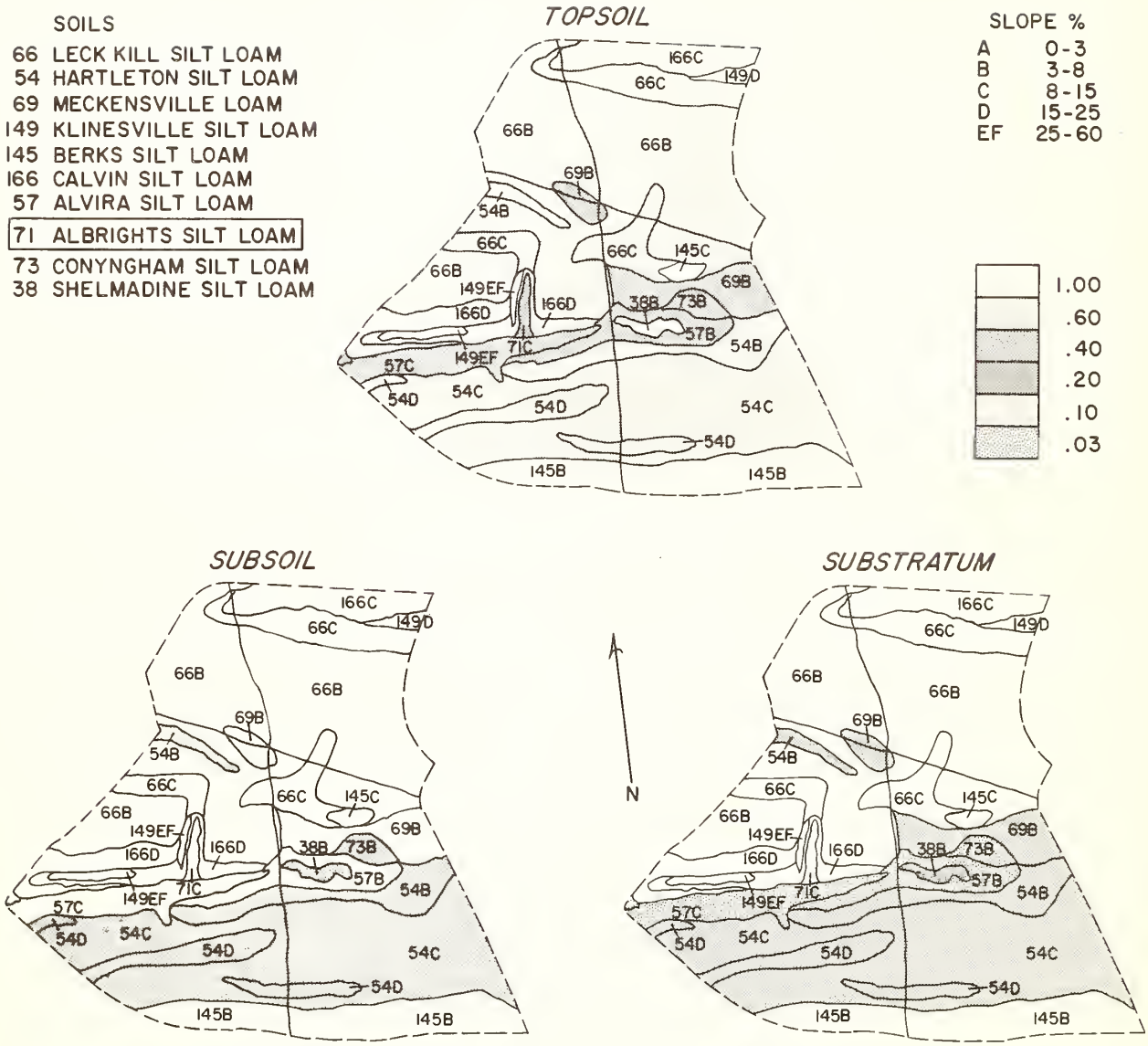


Figure 24.—Relative conductivities of the topsoil, subsoil, and substratum for different series at the experimental watershed; 1.0 = 107 cm/day.

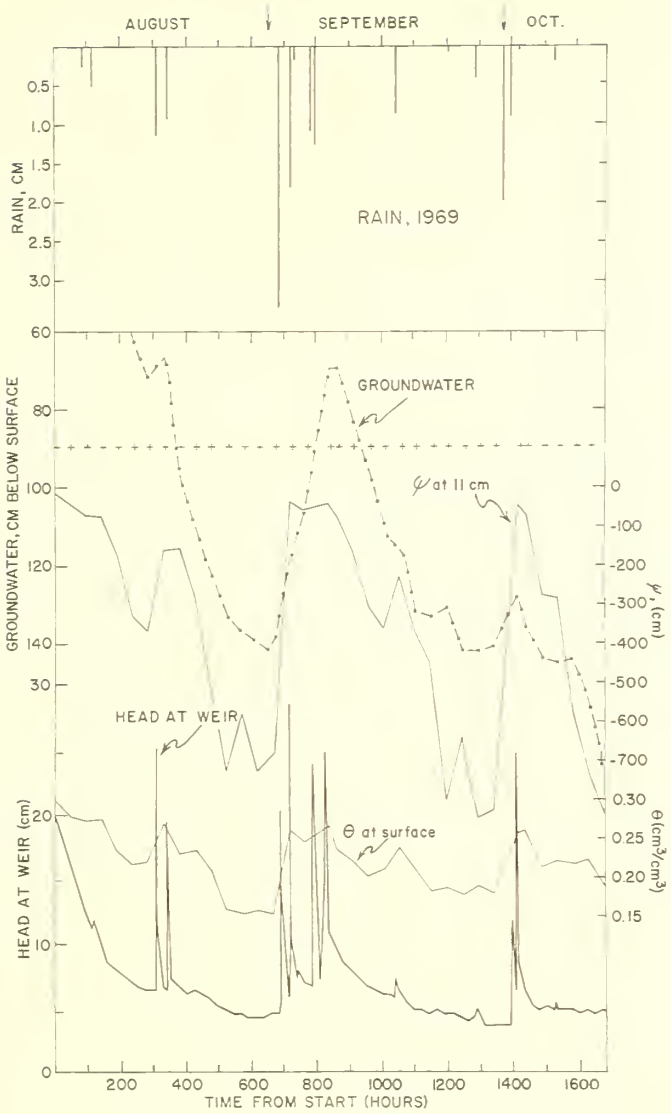


Figure 25.—Comparison of the head at the weir with the rain, groundwater level, soil water content, and soil water pressure on the Albrights silt loam.

CONCLUSIONS

When considering a transient response of a watershed to rainfall "pulses," it is advisory to instrument soil pedons in the pathways of flow with the following: A shallow well, microlysimeters, piezometers, and tensiometers. Soil water content and soil water pressure fluctuation measurements within the surface layer contain the greatest amount of information relative to the water flux. The time interval of 48 hours is satisfactory from the standpoint of describing the transient behavior of the watershed as a whole. However, prediction of runoff pulses would necessitate recording instrumentation for short duration records in the immediate vicinity of the stream on the Mahantango Experimental Watershed.

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APPENDIX 1.—Description of the Albrights silt loam profile

The Albrights series is a member of a fine-loamy, mixed, mesic family of Aquic Fragiudalfs.

AP	0–17.8 cm	Dark reddish brown (5YR 3/3) silt loam; weak, fine granular structure; very friable, nonsticky and nonplastic; (pH 6.8); abrupt smooth boundary; (6 to 8 inches thick).
A3	17.8–33.0 cm	Reddish brown (5YR 4/3) silt loam; weak, coarse subangular blocky breaking to weak, coarse granular structure; friable, nonsticky and slightly plastic; (pH 5.8) clear wavy boundary; (4 to 7 inches thick). Permeability moderate to moderately rapid.
B2t	33.0–61.0 cm	Reddish brown (5YR 4/4) channery silt loam with few fine, faint yellowish red (5YR 5/8) and reddish gray (5YR 5/2) mottles; weak, coarse prismatic breaking to weak, medium to coarse subangular blocky structure; friable, slightly sticky and slightly plastic; (pH 5/4); 15-percent coarse fragments; abrupt, wavy boundary; (10 to 12 inches thick). Thin continuous clay films. Permeability moderate.

Bx1 61.0–116.8 cm Red (2.5YR 4/6) silty clay loam with many medium distinct yellowish red (5YR 4/8) and pinkish gray (5YR 6/2) mottles; pinkish gray (5YR 7/2) and yellowish red (5YR 5/8) prism faces; weak, very coarse prismatic breaking to moderate coarse platy structure; very firm, sticky plastic; 10 percent coarse fragments; (pH 5.2); gradual wavy boundary; (20 to 26 inches thick). Clay films. Thick in pores, patches on red faces. Permeability slow.

Bx2 116.8–162.6 cm Dark reddish brown (2.5YR 3/4) gravelly loam with common medium distinct weak red (10YR 5/2) and pinkish gray (5YR 6/2) mottles; pinkish gray (5YR 7/2) and yellowish red (5YR 5/8) prism faces; weak, very coarse prismatic breaking to weak coarse platy structure; firm, slightly sticky and nonplastic; 60-percent coarse fragments; (pH 5.0); gradual wavy boundary; (15 to 20 inches thick). Clay films moderately thick in pores. Permeability slow.

Bx3 162.6–203.2 cm Reddish brown (2.5YR 4/4) gravelly sandy loam, weak, coarse platy structure; firm, nonsticky and nonplastic; 70-percent coarse fragments; (pH 5.0). Clay films moderately thick in pores. Permeability slow.

Site location: Photo Pa-MW-1-8, Upper Mahanoy Township. Snyder Farm. Below road 55 feet; 110 feet to upper end of patch of trees south of pit.

Native Vegetation: Wheat stubble (meadow).

Parent Material: Glacial Till - Pre-Wisconsin.

Physiography: Lower foot slopes, Upland Appalachian Ridge and Valley Province.

Relief: Gently sloping.

Elevation: 890 feet.

Slope: 6 percent.

Aspect: Southeast.

Erosion: Moderate.

Permeability: Moderately slow.

Drainage: Moderately well drained.

Groundwater: Deep when described.

Moisture: Moist when described.

Stoniness: Few fragments to 6 inches on surface, occasional stones in profile (14 inches).

Root Distribution: Many to 12 inches, few to 24 inches. Meadow similar.

Described by: E. H. Sautter and W. M. Kunkle. 10-3-67.

APPENDIX 2.–Slope elevations

Elevations above bench mark

Station	Elevation	Station	Elevation	Station	Elevation
	meters		*meters*		*meters*
0	2.301	35	4.892	69	7.858
1	2.350	36	4.944	70	7.946
2	2.414	37	5.023	71	7.992
3	2.466	38	5.108	72	8.028
4	2.518	39	5.212	73	8.099
5	2.588	40	5.304	74	8.141
6	2.670	41	5.374	75	8.217
7	2.728	42	5.432	76	8.278
8	2.807	43	5.550	77	8.348
9	2.868	44	5.621	78	8.419
10	2.929	45	5.730	79	8.461
11	3.002	46	5.800	80	8.507
12	3.051	47	5.852	81	8.556
13	3.142	48	5.956	82	8.644
14	3.243	49	6.023	83	8.705
15	3.313	50	6.050	84	8.784
16	3.389	51	6.130	85	8.888
17	3.450	52	6.212	86	8.967
18	3.551	53	6.337	87	9.043
19	3.630	54	6.407	88	9.117
20	3.722	55	6.453	89	9.208
21	3.789	56	6.507	90	9.284
22	3.880	57	6.593	91	9.397
23	3.978	58	6.651	92	9.455
24	4.066	59	6.736	93	9.537
25	4.167	60	6.837	94	9.635
26	4.243	61	6.934	95	9.757
27	4.301	62	7.032	96	9.793
28	4.392	63	7.096	97	9.885
29	4.432	64	7.294	98	9.961
30	4.493	65	7.483	99	10.052
31	4.575	66	7.721	100	10.144
32	4.670	67	7.882		
33	4.724	68	7.937		
34	4.834				

APPENDIX 3.–Rain catch variability and rainfall data

Rain catch variability[1]

Date	Rain cm	C_v pct	Date	Rain cm	C_v pct
8-11-69	0.64	2	6-19-70	3.78	2
8-19-69	1.35	2	6-23-70	.66	5
8-21-69	.99	2	6-27-70	1.65	4
9- 4-69	5.48	2	7- 3-70	4.01	3
9- 9-69	2.49	1	7-10-70	4.27	5
9-18-69	.91	7	7-17-70	.97	7
10-3-69	3.24	1	7-21-70	2.36	5
			8- 2-70	1.04	2
			8-24-70	4.01	4
			9- 1-70	1.30	5
			9-19-70	.60	3

[1] For rains $\geqslant$ 0.6 cm; rains < 0.6 cm showed an average C_v of 18 percent along the slope.

APPENDIX 3.–Rain catch variability and rainfall data –(Continued)

Rainfall data

Date	Time[1] (h)		Amount (cm)	Duration (h)	Intensity (cm/h)
	Start	End			
8- 9-69	82.92	83.84	0.24	0.92	0.26
8-11-69	108.10	109.02	.19	.92	.21
	111.04	111.88	.07	.84	.08
	119.83	120.58	.25	.75	.33
8-19-69	310.42	311.17	1.14	.75	1.52
8-21-69	342.63	343.48	.93	.85	1.09
9- 4-69	686.83	689.83	.51	3.00	.17
	689.83	692.33	2.29	2.50	.91
	692.33	695.00	.58	2.67	.22
	686.83	695.00	3.38	8.17	.41
	718.00	720.00	1.77	2.00	.89
9- 6-69	743.83	744.00	.17	.17	1.00
9- 9-69	779.25	779.45	.93	.20	4.65
	780.77	780.87	.16	.10	1.60
	795.33	796.66	1.21	1.33	.91
9-18-69	1,039.83	1,040.09	.36	.26	1.38
	1,040.37	1,040.58	.18	.21	.86
	1,042.33	1,048.50	.32	6.17	.05
9-26-69	1,223.33	1,224.33	.06	1.00	.06
9-28-69	1,285.93	1,286.03	.25	.10	2.50
	1,286.33	1,287.00	.15	.67	.22
10-3-69	1,367.83	1,380.33	1.98	12.50	.16
	1,387.66	1,388.33	.81	.67	1.20
10-4-69	1,420.92	1,421.25	.05	.33	.15
10-8-69	1,524.17	1,529.00	.20	4.83	.04
6-17-70	12.50	15.00	.51	2.50	.20
6-19-70	66.00	68.50	1.27	2.50	.51
	78.00	78.75	1.07	.75	1.42
	81.50	81.75	1.17	.25	4.67
6-23-70	145.75	148.59	.45	2.54	.16
	154.30	154.38	.13	.08	1.58
6-27-70	276.00	277.00	.76	1.00	.76
	279.50	281.67	.51	2.17	.24
7- 3-70	399.00	400.50	3.25	1.50	2.17
	417.33	419.41	.15	2.08	.07
	420.00	420.25	.34	.25	1.37
7- 5-70	443.33	443.66	.28	.33	.85
7-10-70	561.67	562.08	.61	.41	1.49
	578.50	588.67	3.40	10.17	.34
	591.33	592.67	.53	1.34	.40
7-17-70	731.67	733.00	.51	1.33	.38
	739.50	741.00	.31	1.50	.21
7-21-70	829.67	830.67	.52	1.00	.52
	848.17	848.25	.51	.08	6.38
	851.50	852.00	1.12	.50	2.24
7-25-70	933.33	933.41	.13	.08	1.63
7-31-70	1,072.67	1,073.00	.09	.33	.27
8- 2-70	1,117.50	1,118.00	.86	.50	1.72
	1,119.32	1,119.39	.15	.07	2.14
8- 4-70	1,160.83	1,161.00	.20	.17	1.18
8-14-70	1,401.00	1,401.33	.10	.33	.30
8-18-70	1,497.25	1,497.33	.13	.08	1.62
8-20-70	1,543.33	1,543.48	.25	.15	1.67
	1,557.50	1,558.00	.15	.50	.30
8-22-70	1,602.50	1,602.67	.10	.17	.59
8-24-70	1,647.00	1,648.13	.19	1.13	.17
	1,648.13	1,650.50	1.27	2.37	.54
	1,647.00	1,650.50	1.46	3.50	.42
	1,652.28	1,653.32	1.17	1.04	1.13
	1,654.30	1,656.00	.36	1.70	.21

See footnote at end of table.

APPENDIX 3.–Rain catch variaiblity and rainfall data –(Continued)

Rainfall data

Date	Time[1] (h)		Amount (cm)	Duration (h)	Intensity (cm/h)
	Start	End			
8-30-70	1,800.00	1,801.00	.10	1.00	.10
9-1-70	1,836.33	1,836.46	.36	.13	2.77
	1,838.33	1,838.83	.30	.50	.60
	1,841.00	1,842.25	.61	1.25	.49
9- 5-70	1,924.00	1,924.08	.008	.008	1.00
	1,931.00	1,931.10	.18	.10	1.80
	1,932.60	1,932.70	.15	.10	1.50
9- 9-70	2,039.08	2,039.42	.25	.34	.74
9-11-70	2,097.50	2,097.83	.66	.33	2.00
9-19-70	2,285.50	2,286.70	.69	1.20	.58

[1] Experimental time starts at 8 a.m. on 6-15-70; measurements were made in 2-day intervals with the ending date describing the period, i.e., 6-15-70 to 6-17-70 is described by 6-17-70 and the time 12.50 to 15.00 pertains to hours after 8 a.m. on 6-15-70.

APPENDIX 4. Water table response to precipitation

GROUNDWATER (CM BELOW SURFACE)

DATE	TIME	1	2	3	4	5	6	7
80569	4.83	159			66			1
80769	51.00	152			85			6
80969	97.91	160			90			17
81169	147.25	188			126			33
81369	193.96	207			128			48
81569	244.58	216			145			64
81769	288.66	217			147			72
81969	340.20	222			131			66
82169	386.79	248			169			97
82369	433.75	258			177			112
82569	482.71	264			177			122
82769	531.16	271			182			133
82969	580.06	278			187			137
83169	625.75	278			182			140
90269	676.55	278			180			142
90469	725.60	279			173			119
90669	769.58	282			175			105
90969	844.97	271			102			69
91069	868.93	258			103			69
91269	918.14	250			104			84
91469	969.25	253			156			98
91669	1013.49	251			165			112
91869	1064.76	258			175			117
92069	1105.72	268			179			132
92269	1157.50	271			179			133
92469	1205.31	263			174			131
92669	1251.94	267			179			142
92869	1302.33	279			179			142
93069	1347.00	283			180			141
100369	1420.62	283			182			128
100469	1441.83	287			182			136
100669	1494.08	287			183			144
100869	1541.50	288			183			145
101069	1589.12	292			180			144
101269	1634.37	297			182			154
101469	1682.37	301			185			174

GROUNDWATER (CM BELOW SURFACE)

DATE	TIME	1	2	3	4	5	6	7
61570	4.66	287	*****	*****	185	146	140	132
61770	52.87	287	*****	*****	183	146	140	132
61970	101.42	287	*****	*****	145	137	133	99
62170	144.62	287	*****	*****	163	132	126	94
62370	193.99	284	*****	*****	178	122	126	109
62570	243.04	282	*****	*****	178	127	130	118
62770	288.71	278	*****	*****	174	130	135	114
62970	338.62	287	*****	*****	183	130	140	130
70170	387.41	287	*****	*****	180	133	145	131
70370	432.83	274	*****	*****	131	127	119	76
70570	486.03	254	*****	*****	127	119	119	94
70770	533.21	254	*****	*****	145	117	122	117
71070	603.33	244	*****	23	102	86	76	34
71170	625.91	206	*****	43	102	107	51	33
71370	673.91	199	*****	76	110	89	56	43
71770	771.13	216	130	91	135	86	94	69
71970	822.29	241	157	99	163	91	114	91
72170	867.50	236	155	93	159	94	114	93
72370	915.50	251	164	104	179	102	124	99
72570	960.66	257	164	109	180	103	127	100
72770	1012.62	259	171	107	180	113	140	122
72970	1059.33	262	175	107	182	119	145	128
73170	1107.62	267	174	107	180	122	147	130
80270	1160.11	264	173	109	183	124	150	130
80470	1203.54	272	185	112	180	128	*****	130
80670	1251.83	277	190	114	183	132	*****	*****
80870	1297.12	279	192	114	183	135	*****	*****
81070	1345.75	282	196	118	183	137	*****	*****
81270	1396.50	284	193	119	183	138	*****	*****
81470	1443.04	287	203	121	185	137	*****	*****
81670	1495.50	288	203	121	185	145	*****	*****
81870	1538.75	290	202	121	185	145	*****	*****
82070	1587.00	290	204	118	180	145	*****	*****
82270	1632.75	291	206	124	187	145	*****	*****
82470	1684.00	288	203	112	184	145	*****	*****
82670	1732.00	293	208	124	188	145	*****	*****
82870	1779.50	295	208	124	185	145	*****	*****
83070	1831.79	295	210	126	185	145	*****	*****
90170	1875.62	297	211	128	188	145	*****	*****
90570	1974.54	295	204	122	184	147	*****	*****

SHALLOW WELL

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
61570	6.03	68.3	0.0
61570	14.00	68.3	1.42
61570	14.75	67.2	2.44
61570	15.50	65.4	1.22
61570	16.00	64.8	1.22
61670	16.50	64.2	0.49
61670	17.00	63.9	0.21
61670	18.00	63.7	0.0
61670	21.50	63.7	-0.10
61670	23.00	63.9	-0.13
61670	29.00	64.6	-0.10
61670	33.50	65.1	-0.10
61770	54.50	67.2	0.0
61870	66.25	67.2	5.79
61870	67.25	61.4	8.94
61870	68.00	54.7	12.19
61870	68.25	51.7	7.32
61870	68.50	49.8	7.32
61870	68.75	48.0	3.66
61870	69.00	47.1	2.44
61870	69.25	46.5	0.0
61870	69.75	46.5	-0.81
61870	70.50	47.1	-1.22
61870	72.00	48.9	-1.10
61870	73.25	50.3	-0.89
61870	76.50	53.2	-0.70
61870	78.25	54.4	21.34
61870	78.75	43.7	14.63
61870	79.00	40.1	12.19
61870	79.25	37.0	8.53
61870	79.50	34.9	2.68
61870	79.75	34.2	0.98
61870	80.00	34.0	0.0
61870	80.50	34.0	-0.81
61870	81.25	34.6	-5.49
61870	81.33	35.1	11.89
61870	81.50	33.1	30.48
61870	81.75	25.5	12.19
61870	82.00	22.4	5.24
61870	82.25	21.1	0.85
61870	82.50	20.9	-0.41
61870	83.25	21.2	-1.05
61870	85.00	23.0	-0.20
61870	86.50	23.3	-0.15
61870	87.50	23.5	-0.03
61970	92.00	23.6	-0.05
61970	95.00	23.8	-0.30
61970	96.50	24.2	-0.56
61970	102.50	27.6	-0.73
61970	105.00	29.4	-0.47

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
61970	106.50	30.1	-0.18
61970	108.50	30.5	-0.08
61970	110.50	30.6	-0.26
62070	116.00	32.1	-0.43
62070	120.50	34.0	-0.65
62070	126.17	37.6	-0.77
62070	128.75	39.6	-0.56
62070	130.00	40.3	-0.35
62070	133.00	41.4	-0.28
62070	135.50	42.1	-0.24
62170	145.00	44.3	-0.16
62170	146.50	44.6	0.98
62170	146.75	44.3	3.22
62170	148.83	37.6	1.32
62170	149.25	37.1	0.85
62170	149.50	36.9	0.30
62170	150.00	36.7	0.0
62170	151.25	36.7	-0.24
62170	152.00	36.9	-0.59
62170	153.25	37.6	0.76
62170	154.25	36.9	0.0
62170	154.75	36.9	-0.76
62170	155.75	37.6	0.0
62170	157.75	37.6	-0.53
62270	162.50	40.2	-0.34
62270	163.50	40.5	-0.51
62270	175.75	46.8	-0.38
62270	178.50	47.8	-0.30
62270	184.00	49.5	-0.30
62370	193.50	52.3	-0.45
62370	195.00	52.9	-0.47
62370	200.00	55.3	-0.37
62370	201.50	55.8	-0.24
62370	203.50	56.3	-0.15
62470	209.00	57.1	-0.14
62470	217.50	58.4	-0.28
62470	224.00	60.2	-0.18
62470	226.00	60.6	-0.00
62570	239.00	60.6	-0.16
62570	241.50	61.0	-0.39
62570	244.50	62.2	-0.55
62570	245.00	62.5	-0.38
62570	247.50	63.4	-0.27
62570	250.00	64.1	-0.16
62570	251.50	64.3	-0.06
62670	257.00	64.6	0.0
62670	260.50	64.6	-0.08
62670	269.25	65.3	0.0
62670	271.25	65.3	0.12
62670	272.00	65.2	0.0

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
62670	275.92	65.2	6.77
62670	276.75	59.6	7.32
62670	277.00	57.8	4.27
62670	277.25	56.7	2.80
62670	277.50	56.0	0.73
62670	278.00	55.6	0.21
62670	279.00	55.4	0.0
62670	279.75	55.4	-0.43
62770	280.25	55.6	0.0
62770	280.75	55.6	1.22
62770	281.00	55.3	3.96
62770	282.00	51.4	2.01
62770	282.50	50.4	0.79
62770	283.00	50.0	-0.02
62770	284.50	50.0	0.30
62770	285.00	49.8	0.0
62770	286.00	49.8	-0.43
62770	286.50	50.0	-0.71
62770	288.00	51.1	-0.79
62770	289.67	52.4	-1.22
62770	293.00	56.5	-0.47
62770	296.00	57.9	-0.52
62770	299.00	59.4	-0.37
62770	301.50	60.4	-0.56
62870	304.50	62.0	-0.40
62870	309.50	64.0	-0.32
62870	322.25	68.1	-0.17
62970	340.00	71.2	-0.10
62970	348.50	72.0	0.0
63070	353.00	72.0	0.05
63070	360.50	71.7	0.0
63070	363.00	71.7	-0.07
63070	376.00	72.5	-0.09
70170	384.00	73.2	-0.20
70170	389.00	74.2	-0.08
70170	393.50	74.6	0.0
70170	399.00	74.6	25.85
70170	399.25	68.1	34.14
70170	399.50	59.6	34.14
70170	399.75	51.1	24.38
70170	400.00	45.0	24.38
70270	400.25	38.9	24.38
70270	400.50	32.8	13.41
70270	400.75	29.4	6.10
70270	401.00	27.9	3.29
70270	401.25	27.1	0.61
70270	401.50	26.9	0.0
70270	402.25	26.9	-0.27
70270	404.50	27.5	-0.21
70270	405.50	27.7	-0.04

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
70270	407.75	27.8	-0.07
70270	408.67	27.9	-0.73
70270	409.50	28.5	-0.04
70270	410.28	28.5	-0.62
70270	412.12	29.7	0.0
70270	413.00	29.7	-0.86
70270	414.67	31.1	-0.04
70270	415.50	31.1	-0.35
70270	417.17	31.7	8.13
70270	417.50	29.0	4.63
70270	417.75	27.8	0.98
70270	418.00	27.6	0.0
70270	418.75	27.6	-0.20
70270	419.50	27.7	-0.51
70270	419.92	28.0	14.81
70270	420.25	23.0	4.63
70270	420.50	21.9	0.0
70270	421.25	21.9	-1.01
70270	423.00	23.6	-0.61
70270	423.50	23.9	-0.43
70370	429.50	26.5	-0.25
70370	431.33	27.0	-0.69
70370	433.75	28.7	-0.97
70370	436.75	31.5	-0.65
70370	440.50	34.0	0.0
70370	443.00	34.0	-0.46
70370	443.33	34.1	9.51
70370	444.00	27.8	3.78
70370	444.25	26.9	0.0
70370	445.00	26.9	-0.75
70370	447.00	28.3	-0.57
70470	450.50	30.3	-0.41
70470	453.50	31.5	-0.14
70470	455.67	31.9	-0.18
70470	456.00	31.9	0.0
70470	457.33	31.9	-1.01
70470	461.50	36.1	-0.64
70470	462.50	36.8	-0.71
70470	463.75	37.6	-0.73
70470	465.50	38.9	-0.39
70470	467.00	39.5	-0.36
70470	472.00	41.3	-0.23
70570	480.00	43.1	-0.51
70570	484.75	45.6	-0.41
70570	487.00	46.5	-0.42
70570	491.00	48.2	-0.22
70670	498.50	49.8	-0.29
70670	504.50	51.6	-0.50
70670	512.00	55.4	-0.39
70670	514.50	56.3	-0.20

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
70670	516.75	56.8	-0.23
70770	529.75	59.7	-0.43
70770	534.00	61.6	-0.27
70770	539.00	62.9	2.87
70770	544.00	48.6	-0.51
70870	553.50	53.5	-1.45
70870	561.50	65.1	1.83
70870	561.75	64.6	5.18
70870	562.25	62.0	3.66
70870	562.50	61.1	1.58
70870	562.75	60.7	0.85
70870	563.00	60.5	0.0
70870	564.25	60.5	-0.39
70970	569.00	62.3	-0.21
70970	578.25	64.3	-0.06
70970	581.00	64.4	0.85
70970	581.25	64.2	1.46
70970	581.50	63.9	2.44
70970	581.75	63.2	4.88
70970	582.00	62.0	18.29
70970	582.25	57.5	14.63
70970	582.50	53.8	9.75
70970	582.75	51.4	6.95
70970	583.00	49.6	5.85
70970	583.25	48.2	3.05
70970	583.50	47.4	3.05
70970	583.75	46.6	1.05
70970	584.42	45.9	1.93
70970	585.00	44.8	0.98
70970	585.25	44.6	0.08
70970	586.00	44.5	9.14
70970	586.75	37.6	9.75
70970	587.00	35.2	7.77
70970	587.33	32.6	21.58
70970	587.75	23.6	10.97
70970	588.00	20.9	-2.29
70970	587.33	19.4	10.06
70970	587.53	17.3	-0.20
70970	591.08	18.0	2.07
70970	591.33	17.5	3.66
70970	591.75	16.0	0.91
71070	592.25	15.5	0.0
71070	592.67	15.5	-0.85
71070	593.13	15.9	-0.11
71070	594.75	16.1	0.02
71070	601.00	16.0	0.0
71070	610.00	16.0	0.73
71070	610.42	15.7	0.0
71170	620.75	15.7	0.09
71170	624.50	15.4	0.0

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
71170	626.00	15.4	-0.20
71170	626.92	15.5	-0.06
71170	629.50	15.7	-0.46
71170	629.83	15.8	0.0
71170	633.83	15.8	0.08
71170	638.00	15.5	0.03
71270	643.75	15.4	0.16
71270	644.50	15.2	0.02
71270	648.50	15.1	-0.27
71270	652.83	16.3	-0.01
71270	657.00	16.4	0.21
71270	659.00	15.9	0.04
71270	664.00	15.8	0.0
71370	671.75	15.8	-0.38
71370	674.83	16.9	-0.51
71370	678.25	18.7	-0.14
71370	680.00	18.9	0.0
71370	681.50	18.9	0.17
71370	683.50	18.6	-0.00
71470	690.50	18.6	-0.04
71470	694.00	18.7	-0.21
71470	696.50	19.3	-0.62
71470	699.50	21.1	-0.47
71470	701.00	21.8	-0.08
71470	702.50	21.9	-0.26
71470	705.75	22.8	-0.05
71470	712.00	23.1	-0.08
71570	716.00	23.4	-0.10
71570	718.50	23.7	-0.67
71570	719.00	24.0	-0.08
71570	721.33	24.2	-0.29
71570	723.00	24.7	-0.49
71570	723.50	24.9	2.50
71570	724.00	23.7	1.04
71570	724.50	23.2	0.18
71570	725.00	23.1	-0.18
71570	725.50	23.2	-0.91
71570	726.00	23.6	-0.84
71570	727.42	24.8	-0.31
71570	729.50	25.5	0.0
71570	731.42	25.5	-0.98
71570	731.67	25.7	9.87
71570	732.00	22.4	6.10
71570	732.50	19.4	5.36
71570	732.75	18.0	2.56
71570	733.00	17.4	0.0
71570	733.50	17.4	-0.30
71570	734.00	17.5	-1.22
71570	734.50	18.1	-0.76
71670	736.50	19.7	-0.42

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
71670	739.10	20.8	-0.77
71670	739.42	21.0	0.0
71670	739.83	21.0	2.82
71670	740.42	19.4	5.48
71670	740.75	17.5	2.20
71670	741.08	16.8	0.0
71670	741.92	16.8	-0.37
71670	742.50	17.0	-2.07
71670	742.75	17.5	-0.64
71670	745.00	19.0	-0.76
71670	746.00	19.7	-1.04
71670	748.58	22.4	-1.26
71670	751.00	25.5	-0.67
71670	752.00	26.1	-0.53
71670	753.50	26.9	-0.24
71670	755.00	27.3	-0.21
71670	760.00	28.3	-0.29
71770	766.50	30.2	-0.49
71770	767.50	30.7	-0.73
71770	773.25	34.9	-0.49
71770	777.00	36.7	-0.11
71770	779.75	37.0	-0.24
71770	782.25	37.6	-0.25
71870	792.00	40.1	-0.41
71870	793.50	40.7	-0.58
71870	798.75	43.7	-0.49
71870	800.00	44.3	-0.41
71870	801.50	45.0	-0.20
71870	803.00	45.3	0.13
71870	808.00	44.6	-0.29
71970	816.50	47.0	-0.43
71970	823.33	50.0	-0.16
71970	829.67	51.0	5.49
71970	830.50	46.4	4.63
71970	830.75	45.3	3.66
71970	831.00	44.3	1.83
71970	831.25	43.9	0.73
71970	831.67	43.6	0.0
72070	832.75	43.6	-0.36
72070	838.00	45.5	-0.30
72070	844.50	47.4	-0.22
72070	848.00	48.2	7.62
72070	848.50	44.3	5.49
72070	848.75	43.0	3.29
72070	849.00	42.2	2.44
72070	849.25	41.5	0.85
72070	849.75	41.1	0.0
72070	851.00	41.1	-0.27
72070	851.33	41.2	14.26
72070	851.58	37.6	26.33

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
72070	852.00	26.7	12.19
72070	852.25	23.6	3.30
72070	852.42	23.1	0.0
72070	852.83	23.1	-2.04
72070	854.00	25.5	-1.71
72070	854.50	26.3	-1.16
72070	856.00	28.0	-0.78
72170	868.33	37.6	-0.65
72170	869.75	38.6	-0.89
72170	872.50	41.0	-0.61
72170	874.50	42.2	-0.39
72170	879.25	44.0	-0.26
72270	886.50	45.9	-0.32
72270	889.00	46.7	-0.45
72270	896.50	50.1	-0.28
72270	900.00	51.1	-0.22
72270	902.75	51.7	-0.10
72270	904.00	51.8	-0.21
72370	913.67	53.8	-0.37
72370	914.50	54.1	-0.30
72370	918.50	55.3	-0.14
72370	923.00	55.9	-0.07
72470	941.00	57.1	-0.20
72470	945.50	58.1	-0.03
72470	952.00	58.3	-0.01
72570	962.00	58.4	-0.14
72570	971.00	59.6	-0.04
72670	980.00	60.0	-0.12
72670	986.75	60.8	-0.26
72670	991.50	62.0	-0.14
72670	994.50	62.5	-0.04
72670	1000.00	62.7	-0.06
72770	1003.25	62.9	-0.07
72770	1009.00	63.3	-0.19
72770	1014.33	64.3	-0.12
72770	1020.50	65.1	0.0
72870	1026.50	65.1	-0.05
72870	1029.50	65.2	-0.12
72870	1031.00	65.4	-0.07
72870	1034.25	65.6	-0.18
72870	1041.50	66.9	-0.10
72870	1043.00	67.1	-0.03
72870	1048.00	67.2	0.0
72970	1053.50	67.2	-0.08
72970	1061.33	67.8	-0.01
73070	1096.00	68.1	0.0
73170	1097.00	68.1	-0.04
73170	1104.50	68.4	-0.11
73170	1110.00	69.0	-0.08
73170	1117.42	69.6	12.01

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
73170	1118.00	62.6	11.46
73170	1118.25	59.8	4.39
73170	1118.50	58.7	3.05
73170	1118.75	57.9	1.34
73170	1119.00	57.6	0.0
73170	1119.67	57.6	-0.55
73170	1120.00	57.8	-1.01
80170	1122.50	60.3	-0.72
80170	1125.00	62.1	-0.51
80170	1127.75	63.5	-0.32
80170	1136.00	66.1	-0.25
80170	1140.50	67.3	-0.09
80270	1149.50	68.1	-0.04
80270	1153.75	68.3	-0.28
80270	1160.75	70.3	-0.13
80370	1185.00	73.3	0.0
80370	1192.00	73.3	-0.18
80470	1205.67	75.7	-0.12
80470	1216.00	77.0	-0.04
80570	1232.00	77.6	0.0
80670	1242.50	77.6	-0.12
80670	1253.67	78.9	-0.01
80770	1288.00	79.4	-0.04
80870	1298.50	79.9	-0.05
80870	1312.00	80.5	-0.06
80970	1336.00	82.0	-0.04
81070	1347.00	82.4	-0.01
81170	1384.00	82.8	0.0
81270	1387.00	82.8	-0.05
81270	1398.50	83.4	-0.02
81370	1412.50	83.7	-0.07
81370	1425.50	84.6	-0.09
81470	1444.83	86.3	-0.08
81570	1459.00	87.3	-0.09
81570	1473.00	88.5	0.0
81670	1496.50	88.5	0.09
81770	1507.00	87.6	0.0
81770	1514.00	87.6	-0.04
81770	1520.00	87.9	-0.10
81770	1528.00	88.6	-0.12
81870	1540.33	90.1	-0.03
81870	1552.00	90.4	-0.02
81970	1567.50	90.7	0.10
81970	1576.00	89.8	0.04
82070	1588.00	89.3	0.04
82070	1600.00	88.8	0.08
82170	1604.00	88.5	0.0
82170	1607.00	88.5	-0.10
82170	1609.50	88.8	-0.29
82170	1616.00	90.7	-0.01

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
82270	1634.00	90.8	-0.03
82270	1648.00	91.3	0.18
82370	1648.50	91.2	0.85
82370	1648.75	91.0	1.46
82370	1649.00	90.6	10.73
82370	1649.25	87.9	30.48
82370	1649.50	80.3	48.77
82370	1649.75	68.1	17.07
82370	1650.00	63.9	13.41
82370	1650.25	60.5	9.75
82370	1650.50	58.1	6.10
82370	1650.75	56.5	1.83
82370	1651.00	56.1	-2.44
82370	1651.25	56.7	-4.83
82370	1652.13	61.0	18.70
82370	1652.50	54.1	14.02
82370	1653.00	47.1	12.19
82370	1653.25	44.0	4.27
82370	1653.50	43.0	0.49
82370	1653.75	42.9	-1.34
82370	1654.00	43.2	-1.83
82370	1654.33	43.8	1.97
82370	1654.75	43.0	0.12
82370	1655.00	42.9	2.93
82370	1655.25	42.2	0.0
82370	1655.50	42.2	-2.03
82370	1656.25	43.7	-3.34
82370	1657.50	47.9	-2.97
82370	1658.25	50.1	-2.93
82370	1659.50	53.8	-2.52
82370	1661.00	57.6	-2.26
82370	1662.00	59.8	-2.19
82370	1663.00	62.0	-1.77
82370	1664.00	63.8	-1.58
82370	1665.00	65.4	-1.22
82370	1667.25	68.1	-0.11
82370	1670.00	68.4	-1.49
82470	1673.00	72.9	-0.39
82470	1679.50	75.4	-0.24
82470	1682.00	76.0	-0.11
82470	1686.00	76.5	-0.04
82470	1689.50	76.7	-0.20
82570	1697.00	78.2	-0.28
82570	1709.00	81.5	-0.20
82570	1715.00	82.8	-0.11
82670	1733.67	84.9	-0.03
82770	1745.50	85.2	0.0
82770	1748.00	85.2	-0.12
82770	1755.50	86.1	-0.10
82870	1781.67	88.8	-0.01

DATE	TIME (HRS)	LEVEL CM BELOW SURF.	CHANGE (CM/HR)
82970	1796.00	89.0	-0.13
82970	1811.75	91.0	-0.01
83070	1832.50	91.3	0.0
83070	1836.50	91.3	2.74
83070	1837.00	89.9	1.10
83070	1837.42	89.5	0.26
83070	1838.00	89.3	0.04
83070	1838.75	89.3	0.66
83070	1839.63	88.7	0.02
83170	1841.42	88.7	2.30
83170	1842.13	87.0	1.33
83170	1842.75	86.2	0.09
83170	1844.50	86.0	-0.18
83170	1845.00	86.1	-0.42
83170	1853.00	89.5	-0.31
83170	1856.00	90.4	-0.18
83170	1859.00	91.0	-0.02
90170	1877.67	91.3	0.0
90270	1912.00	91.3	0.0
90370	1922.50	91.3	-0.01
90470	1937.00	91.4	0.16
90470	1941.50	90.7	0.09
90470	1944.75	90.4	0.0
90470	1947.50	90.4	-0.11
90470	1953.00	91.0	-0.15
90470	1955.00	91.3	-0.01

APPENDIX 5. Evapotranspiration

EVAPOTRANSPIRATION LOSS,(CM)

DATE	TIME	I=1	I=3	I=5
80569	4.83	*******	*******	*******
80769	51.00	0.1856	0.4569	0.3855
80969	97.91	0.4425	0.6443	0.4669
81169	147.25	0.2382	0.3708	0.7277
81369	193.96	0.7424	0.9280	0.6853
81569	244.58	0.5283	0.9280	0.7139
81769	288.66	0.3998	0.4712	0.3998
81969	340.20	0.1888	0.5253	0.3519
82169	386.79	1.1191	0.3950	1.1334
82369	433.75	0.6710	0.9566	0.6853
82569	482.71	0.9994	0.9280	0.9566
82769	531.16	0.7424	1.2992	2.3272
82969	580.06	0.6282	0.6996	-0.6710
83169	625.75	0.4569	0.4854	0.3998
90269	676.55	0.3998	0.5996	0.6139
90469	725.60	1.6299	-0.1465	0.8753
90669	769.58	0.3956	0.4465	0.3609
90969	844.97	2.4111	2.2970	2.3377
91069	868.93	0.4854	0.3284	0.3855
91269	918.14	0.6425	0.8995	0.5854
91469	969.25	0.7567	0.8424	0.6969
91669	1013.49	0.4997	0.6567	0.5854
91869	1064.76	0.3236	0.5705	0.5828
92069	1105.72	0.6996	0.6139	0.4711
92269	1157.50	0.7139	0.8424	0.5854
92469	1205.31	0.3998	0.4997	0.5283
92669	1251.94	0.2447	0.4242	0.3100
92869	1302.33	0.3607	0.4300	0.3729
93069	1347.00	0.3141	0.3141	0.3998
100369	1420.62	-0.6753	-1.5238	-0.7691
100469	1441.83	0.0623	0.1876	0.1611
100669	1494.08	0.7995	0.6139	0.3712
100869	1541.50	0.4648	0.4465	0.4179
101069	1589.12	0.4711	0.2570	0.6425
101269	1634.37	0.1999	0.5283	0.3569

EVAPOTRANSPIRATION LOSS,(CM)

DATE	TIME	I=1	I=2	I=3	I=4	I=5	I=6
61570	4.66	*******	*******	*******	*******	*******	*******
61770	52.87	0.3816	*******	0.1745	*******	0.1088	*******
61970	101.42	3.5902	*******	2.6805	*******	3.2403	*******
62170	144.62	0.1428	*******	*******	*******	0.0714	*******
62370	193.99	1.0755	*******	0.3602	*******	1.5610	*******
62570	243.04	0.8281	*******	1.1280	*******	0.9852	*******
62770	288.71	0.3093	*******	*******	*******	0.0795	*******
62970	338.62	0.8567	*******	*******	*******	1.0708	*******
70170	387.41	0.9138	*******	0.6140	*******	0.7996	*******
70370	432.83	2.5339	*******	2.1140	*******	2.8295	*******
70570	486.03	0.7425	*******	1.0423	*******	0.4997	*******
70770	533.21	1.0566	*******	1.1994	*******	0.9709	*******
71070	603.33	2.3213	*******	1.1145	*******	1.9943	*******
71170	625.91	0.4013	*******	0.4941	*******	0.4227	*******
71370	673.91	0.9566	*******	1.1565	*******	0.6996	*******
71770	771.13	1.2699	*******	1.5753	*******	1.4626	*******
71970	822.29	1.2850	1.9808	1.4564	1.1098	1.2707	1.5593
72170	867.50	0.3626	0.9676	-0.1459	0.9414	1.0336	0.7321
72370	915.50	0.7282	1.0957	1.0708	0.8991	0.6140	0.7586
72570	960.66	0.1514	0.5995	0.4513	0.5593	0.2371	0.3907
72770	1012.62	1.3850	1.5172	1.6277	1.5031	1.0423	1.2924
72970	1059.33	0.3141	0.5338	0.8138	0.7867	0.8995	0.6041
73170	1107.62	0.4070	0.4593	0.5212	0.7262	-0.0771	0.5374
80270	1160.11	0.9558	0.9998	1.0343	1.1043	0.9986	0.9998
80470	1203.54	*******	0.1921	0.5212	0.5995	0.2086	0.5733
80670	1251.83	*******	0.4776	0.7853	0.8710	0.6568	0.7726
80870	1297.12	*******	0.1545	0.2142	0.5057	0.3427	0.3793
81070	1345.75	*******	0.2248	0.3712	0.4214	0.3712	0.4776
81270	1396.50	1.6991	0.2248	0.4426	0.6322	0.6996	0.8710
81470	1443.04	0.4355	0.1002	0.2013	0.1424	0.5012	0.3390
81670	1495.50	0.5568	0.2669	0.3427	0.4917	0.4141	0.3231
81870	1538.75	0.2071	0.0500	-0.0214	0.0800	0.5855	0.5417
82070	1587.00	-0.0397	0.0948	-0.0126	0.0226	0.1016	0.2212
82270	1632.75	0.2728	0.2124	0.3284	0.2405	0.4998	0.2767
82470	1684.00	0.3364	-0.0856	0.8803	0.0811	0.0294	0.6402
82670	1732.00	0.5426	0.4074	0.4855	0.5198	0.4283	0.4917
82870	1779.50	0.5711	0.3793	0.6853	0.4776	0.6996	0.5479
83070	1831.79	1.0637	0.7805	1.1066	1.0614	0.8653	1.1617
90170	1875.62	0.3277	0.4112	0.1634	0.3128	0.3277	0.2945
90570	1974.54	1.1153	1.0702	1.3238	0.9841	1.1525	1.1464

APPENDIX 6. Soil water

SURFACE WATER CONTENT(CM3/CM3)

DATE	1	2	3	4	5	6
80569	0.2295	0.2610	0.3718	0.2469	0.2840	0.4155
80769	0.2372	0.2446	0.3503	0.2581	0.2612	0.3261
80969	0.2469	0.2468	0.2910	0.2732	0.2544	0.3330
81169	0.2332	0.2583	0.3047	0.2519	0.2728	0.3358
81369	0.2042	0.2229	0.2641	0.2126	0.2083	0.2950
81569	0.1620	0.1918	0.2450	0.2113	0.2100	0.2831
81769	0.1789	0.1973	0.2521	0.2228	0.1849	0.2774
81969	0.2174	0.2987	0.2872	0.2832	0.2382	0.2925
82169	0.2153	0.2046	0.2471	0.1728	0.2449	0.2926
82369	0.2005	0.2329	0.2580	0.1950	0.2545	0.2637
82569	0.1704	0.1960	0.2113	0.2405	0.2110	0.2385
82769	0.1523	0.1705	0.1742	0.1319	0.0915	0.2156
82969	0.1657	0.1402	0.1623	0.1326	0.1029	0.2070
83169	0.1609	0.1553	0.1780	0.0865	0.1430	0.2187
90269	0.1150	0.1464	0.1474	0.1401	0.1642	0.2013
90469	0.2428	0.2752	0.2646	0.2321	0.2295	0.3189
90669	0.2366	0.2532	0.2475	0.2215	0.2156	0.2967
90969	0.2371	0.2662	0.2767	0.2286	0.2641	0.3119
91069	0.1992	0.2549	0.2593	0.1881	0.2184	0.2885
91269	0.1942	0.2369	0.2180	0.2087	0.1914	0.2777
91469	0.1564	0.2261	0.2128	0.2022	0.1579	0.2487
91669	0.1709	0.2111	0.2484	0.1877	0.1754	0.2556
91869	0.2187	0.2622	0.2344	0.2201	0.1980	0.2845
92069	0.1909	0.1837	0.1987	0.1769	0.2138	0.2835
92269	0.1383	0.2103	0.1643	0.1748	0.1610	0.2341
92469	0.1372	0.2016	0.1679	0.1847	0.1650	0.2553
92669	0.1385	0.1828	0.1644	0.1728	0.1602	0.2394
92869	0.1596	0.1996	0.2043	0.1522	0.1590	0.2537
93069	0.1351	0.1986	0.1546	0.1724	0.1692	0.2342
100369	0.2117	0.2748	0.2558	0.2247	0.2552	0.3198
100469	0.2375	0.2754	0.2505	0.2637	0.2387	0.3044
100669	0.1740	0.2077	0.1996	0.1866	0.2272	0.2783
100869	0.1632	0.2486	0.1881	0.1899	0.2552	0.2737
101069	0.1518	0.2543	0.1870	0.1887	0.2568	0.2586
101269	0.1345	0.2528	0.2210	0.2231	0.2213	0.2689
101469	0.1451	0.2320	0.1690	0.1424	0.1911	0.2464

VOLUMETRIC WATER CONTENT(CM3/CM3)

DATE	DEPTH	1	2	3	4	5	6
80569	1						
	2						
	3	0.2539	0.3011	0.4010	0.3474	0.3587	0.3709
	4	0.2805	0.3612	0.4015	0.3562	0.3322	0.3759
	5	0.3707	0.3824	0.3548	0.3576	0.3020	0.2967
	6						
80769	1						
	2						
	3	0.2492	0.2490	0.3963	0.3057	0.3088	0.3827
	4	0.2850	0.3151	0.4096	0.3332	0.3284	0.3921
	5	0.4072	0.3946	0.3613	0.3587	0.3010	0.3095
	6						
80969	1						
	2						
	3	0.2443	0.2460	0.3375	0.2967	0.2751	0.3024
	4	0.2843	0.2980	0.4033	0.3176	0.3088	0.3901
	5	0.4064	0.3927	0.3654	0.3576	0.3074	0.3046
	6						
81169	1						
	2						
	3	0.2401	0.2432	0.3100	0.2942	0.3036	0.2703
	4	0.2748	0.2882	0.3894	0.3155	0.3080	0.3572
	5	0.3673	0.3801	0.3574	0.3554	0.2967	0.3008
	6						
81369	1						
	2						
	3	0.2330	0.2369	0.2978	0.2844	0.2993	0.2634
	4	0.2715	0.2829	0.3498	0.3142	0.3086	0.2944
	5	0.3388	0.3616	0.3598	0.3539	0.2942	0.2997
	6						
81569	1						
	2						
	3	0.2309	0.2281	0.2923	0.2791	0.2959	0.2551
	4	0.2792	0.2785	0.3253	0.3032	0.3026	0.2634
	5	0.3446	0.3419	0.3542	0.3567	0.2907	0.2966
	6						
81769	1						
	2						
	3	0.2237	0.2300	0.2852	0.2784	0.2961	0.2561
	4	0.2736	0.2821	0.2955	0.3029	0.3019	0.2625
	5	0.3180	0.3446	0.3204	0.3488	0.2828	0.2872
	6						
81969	1						
	2						
	3	0.2254	0.2229	0.2858	0.2864	0.3035	0.2597
	4	0.2742	0.2537	0.2963	0.3095	0.3068	0.2701
	5	0.3801	0.3153	0.3236	0.3198	0.2807	0.2904
	6						

DATE	DEPTH	1	2	3	4	5	6
82169	1						
	2						
	3	0.2273	0.2161	0.2953	0.2828	0.2959	0.2606
	4	0.2719	0.2703	0.3047	0.3051	0.3005	0.2655
	5	0.3565	0.3274	0.3469	0.3502	0.2791	0.2918
	6						
82369	1						
	2						
	3	0.2309	0.2251	0.2818	0.2803	0.3010	0.2568
	4	0.2676	0.2809	0.2381	0.3013	0.3051	0.2668
	5	0.3479	0.3431	0.3021	0.3514	0.2750	0.2955
	6						
82569	1						
	2						
	3	0.2214	0.2123	0.2859	0.2774	0.2746	0.2473
	4	0.2689	0.2724	0.3032	0.3015	0.2951	0.2631
	5	0.3270	0.3380	0.3212	0.3525	0.2768	0.2880
	6						
82769	1						
	2						
	3	0.2285	0.2023	0.2795	0.2647	0.2801	0.2414
	4	0.2750	0.2510	0.2954	0.2884	0.2976	0.2614
	5	0.3261	0.3138	0.3166	0.3454	0.2782	0.2874
	6						
82969	1						
	2						
	3	0.2078	0.2092	0.2711	0.2679	0.2870	0.2365
	4	0.2612	0.2742	0.2955	0.2926	0.3060	0.2598
	5	0.3110	0.3399	0.3097	0.3576	0.2909	0.2834
	6						
83169	1						
	2						
	3	0.2091	0.1938	0.2684	0.2583	0.2696	0.2279
	4	0.2602	0.2607	0.2926	0.2816	0.2881	0.2522
	5	0.3066	0.3213	0.3079	0.3495	0.2718	0.2764
	6						
90269	1						
	2						
	3	0.2218	0.1879	0.2573	0.2545	0.2584	0.2221
	4	0.2699	0.2530	0.2796	0.2784	0.2865	0.2485
	5	0.3071	0.3163	0.2880	0.3464	0.2800	0.2833
	6						
90469	1						
	2						
	3	0.2474	0.2354	0.2953	0.2695	0.2645	0.2495
	4	0.2701	0.2488	0.3795	0.2655	0.2823	0.2366
	5	0.3718	0.3109	0.3727	0.3384	0.2740	0.3010
	6						

DATE	DEPTH	1	2	3	4	5	6
90669	1						
	2						
	3	0.2456	0.2370	0.2981	0.2795	0.2869	0.2522
	4	0.2800	0.2663	0.3728	0.2905	0.2898	0.2519
	5	0.3568	0.3234	0.3776	0.3528	0.2716	0.2710
	6						
90969	1						
	2						
	3	0.2460	0.2446	0.3648	0.2952	0.2948	0.2588
	4	0.2825	0.2765	0.4156	0.3508	0.2969	0.2502
	5	0.3864	0.3313	0.3850	0.3585	0.2749	0.3154
	6						
91069	1						
	2						
	3	0.2460	0.2406	0.3111	0.2782	0.2699	0.2581
	4	0.2819	0.2660	0.4005	0.2916	0.2911	0.2477
	5	0.3854	0.3125	0.3802	0.3613	0.2884	0.3156
	6						
91269	1						
	2						
	3	0.2364	0.2348	0.3006	0.2797	0.2640	0.2520
	4	0.2751	0.2516	0.3791	0.2952	0.2896	0.2515
	5	0.3721	0.3077	0.3595	0.3702	0.2829	0.3176
	6						
91469	1						
	2						
	3	0.2379	0.2391	0.2990	0.2815	0.2780	0.2494
	4	0.2807	0.2876	0.3418	0.3059	0.2977	0.2581
	5	0.3708	0.3435	0.3756	0.3558	0.2813	0.2756
	6						
91669	1						
	2						
	3	0.2173	0.2247	0.2844	0.2760	0.2862	0.2393
	4	0.2581	0.2413	0.3044	0.2965	0.3140	0.2485
	5	0.3232	0.3233	0.3508	0.3651	0.2967	0.2743
	6						
91869	1						
	2						
	3	0.2182	0.2192	0.2822	0.2782	0.2597	0.2373
	4	0.2642	0.2511	0.2958	0.3004	0.2938	0.2397
	5	0.3321	0.3072	0.3171	0.3668	0.2790	0.2842
	6						
92069	1						
	2						
	3	0.2221	0.2142	0.2771	0.2731	0.2799	0.2411
	4	0.2706	0.2671	0.2889	0.2900	0.3021	0.2582
	5	0.3379	0.3198	0.3051	0.3510	0.2852	0.2765
	6						

DATE	DEPTH	1	2	3	4	5	6
92269	1						
	2						
	3	0.2087	0.2098	0.2750	0.2742	0.2980	0.2439
	4	0.2589	0.2654	0.2906	0.2954	0.3139	0.2582
	5	0.3130	0.3263	0.3033	0.3662	0.2882	0.2856
	6						
92469	1						
	2						
	3	0.2043	0.2057	0.2652	0.2596	0.2502	0.2194
	4	0.2563	0.2635	0.2857	0.2721	0.2791	0.2246
	5	0.3202	0.3224	0.2847	0.3596	0.2744	0.2759
	6						
92669	1						
	2						
	3	0.2013	0.2057	0.2611	0.2584	0.2465	0.2292
	4	0.2512	0.2334	0.2839	0.2744	0.2805	0.2408
	5	0.3123	0.3056	0.2839	0.3510	0.2767	0.2745
	6						
92869	1						
	2						
	3	0.2043	0.1995	0.2615	0.2768	0.2746	0.2211
	4	0.2622	0.2614	0.2865	0.2957	0.2931	0.2390
	5	0.3123	0.3283	0.3010	0.3768	0.2773	0.2701
	6						
93069	1						
	2						
	3	0.1809	0.1953	0.2552	0.2584	0.2347	0.2211
	4	0.2343	0.2293	0.2797	0.2750	0.2647	0.2327
	5	0.3015	0.2979	0.2739	0.3605	0.2659	0.2776
	6						
100369	1						
	2						
	3	0.2247	0.2137	0.2757	0.2650	0.2451	0.2308
	4	0.2530	0.2295	0.2872	0.2714	0.2711	0.2246
	5	0.3123	0.2994	0.3076	0.3517	0.2739	0.2725
	6						
100469	1						
	2						
	3	0.2271	0.2099	0.2705	0.2693	0.2712	0.2365
	4	0.2627	0.2565	0.2766	0.2830	0.2840	0.2433
	5	0.3160	0.3188	0.2849	0.3500	0.2741	0.2683
	6						
100669	1						
	2						
	3	0.2214	0.2091	0.2737	0.2692	0.2463	0.2348
	4	0.2524	0.2217	0.2847	0.2720	0.2725	0.2357
	5	0.3084	0.2871	0.2684	0.3443	0.2724	0.2730
	6						

DATE	DEPTH	1	2	3	4	5	6
100869	1						
	2						
	3	0.2144	0.2133	0.2745	0.2713	0.2488	0.2346
	4	0.2482	0.2529	0.2880	0.2849	0.2769	0.2362
	5	0.3052	0.3099	0.2828	0.3584	0.2735	0.2680
	6						
101069	1						
	2						
	3	0.2096	0.2074	0.2700	0.2648	0.2487	0.2315
	4	0.2479	0.2455	0.2818	0.2699	0.2688	0.2375
	5	0.3110	0.3062	0.2845	0.2655	0.2681	0.2680
	6						
101269	1						
	2						
	3	0.2666	0.2080	0.2691	0.2738	0.2675	0.2345
	4	0.3229	0.2464	0.2857	0.2895	0.2833	0.2613
	5	0.3598	0.3095	0.2894	0.3569	0.2720	0.2496
	6						
101469	1						
	2						
	3	0.0786	0.1174	0.1787	0.1414	0.1354	0.1535
	4	0.2133	0.2126	0.2773	0.2300	0.2263	0.2047
	5	0.2893	0.2888	0.2711	0.2023	0.2932	0.2501
	6						

SURFACE WATER CONTENT(CM3/CM3)

DATE	1	2	3	4	5	6
61570	0.2717	0.2565	0.2279	0.2461	0.2527	0.2687
61770	0.1916	0.2511	0.2633	0.2540	0.2736	0.2752
61970	0.2076	0.2546	0.2386	0.2651	0.2674	0.2831
62170	0.2276	0.2720	0.2304	0.2653	0.2590	0.2631
62370	0.2707	0.3060	0.2315	0.2776	0.2833	0.3160
62570	0.2212	0.2572	0.2072	0.1892	0.2215	0.2799
62770	0.2359	0.3067	0.2308	0.2553	0.2763	0.3106
62970	0.2064	0.2655	0.2574	0.2213	0.2286	0.2960
70170	0.2233	0.2087	0.1783	0.2038	0.2153	0.2687
70370	0.2795	0.2678	0.2497	0.2759	0.2548	0.2979
70570	0.2229	0.2461	0.2233	0.2617	0.2380	0.3133
70770	0.1696	0.1768	0.1710	0.2102	0.2252	0.2700
71070	0.2571	0.2796	0.2344	0.2905	0.2719	0.3491
71170	0.2814	0.2784	0.2226	0.2928	0.2718	0.3207
71370	0.2507	0.2517	0.2217	0.2121	0.2506	0.3111
71770	0.2441	0.1972	0.1869	0.2259	0.2538	0.3347
71970	0.1652	0.2051	0.1528	0.1992	0.2083	0.2866
72170	0.1919	0.2472	0.1923	0.2276	0.2511	0.3094
72370	0.1885	0.2249	0.1699	0.2074	0.2314	0.3034
72570	0.2211	0.2521	0.2095	0.2480	0.2378	0.2771
72770	0.2000	0.2060	0.1563	0.1820	0.2187	0.2833
72970	0.1866	0.1921	0.1430	0.2054	0.2013	0.2600
73170	0.1768	0.1964	0.1426	0.2067	0.1605	0.2749
80270	0.1657	0.1876	0.1361	0.1902	0.1622	0.2877
80470	0.1696	0.1979	0.1489	0.2125	0.2026	0.2899
80670	0.1488	0.1575	0.1744	0.1960	0.1755	0.2589
80870	0.1437	0.1447	0.1712	0.1983	0.1611	0.2618
81070	0.1440	0.1385	0.1308	0.1907	0.1565	0.2511
81270	0.1169	0.1411	0.1523	0.1728	0.1744	0.1907
81470	0.1242	0.1095	0.1204	0.1394	0.1586	0.1907
81670	0.1021	0.0925	0.1378	0.1729	0.1266	0.1911
81870	0.0777	0.0950	0.1232	0.1946	0.1181	0.1601
82070	0.1712	0.1702	0.1891	0.2623	0.1727	0.2588
82270	0.1411	0.1390	0.1310	0.1985	0.1741	0.1860
82470	0.2233	0.2395	0.2089	0.2407	0.2030	0.2530
82670	0.1701	0.2103	0.1852	0.1923	0.1771	0.2573
82870	0.1442	0.1589	0.1473	0.1840	0.1420	0.1895
83070	0.1203	0.1377	0.1385	0.1870	0.1408	0.1811
90170	0.1648	0.1843	0.1629	0.1879	0.1530	0.2048
90570	0.1463	0.1682	0.1181	0.1846	0.1364	0.2288

VOLUMETRIC WATER CONTENT(CM3/CM3)

DATE	DEPTH	1	2	3	4	5	6
61570	1						
	2						
	3	0.2113	0.2093	0.2698	0.2778	0.2492	0.2269
	4	0.2553	0.2593	0.2845	0.2949	0.2518	0.2533
	5	0.3155	0.3345	0.3466	0.3436	0.2735	0.2596
	6	0.2756	0.3014	0.3355	0.3394	0.2523	0.2281
61770	1						
	2						
	3	0.2177	0.2072	0.2688	0.2759	0.2401	0.2212
	4	0.2437	0.2541	0.2810	0.3036	0.2326	0.2428
	5	0.3074	0.3230	0.3351	0.3408	0.2670	0.2531
	6	0.2819	0.2886	0.3247	0.3150	0.2421	0.2224
61970	1						
	2						
	3	0.2419	0.2362	0.2885	0.2951	0.2579	0.2492
	4	0.2589	0.2655	0.3024	0.3128	0.2915	0.2718
	5	0.3335	0.3231	0.3461	0.3454	0.2565	0.2571
	6	0.3167	0.2902	0.2952	0.3158	0.2334	0.2350
62170	1						
	2						
	3	0.2371	0.2365	0.2874	0.2864	0.2579	0.2453
	4	0.2625	0.2759	0.3033	0.3210	0.2506	0.2691
	5	0.3409	0.3369	0.3588	0.3502	0.2830	0.2558
	6	0.3271	0.2988	0.3085	0.3183	0.2564	0.2504
62370	1						
	2						
	3	0.2292	0.2272	0.2753	0.2781	0.2494	0.2341
	4	0.2586	0.2564	0.2888	0.2924	0.2342	0.2482
	5	0.3232	0.3211	0.3467	0.3598	0.2746	0.2720
	6	0.3176	0.2968	0.3351	0.3243	0.2572	0.2421
62570	1						
	2						
	3	0.2201	0.2173	0.2709	0.2675	0.2498	0.2234
	4	0.2540	0.2516	0.2893	0.2827	0.2412	0.2368
	5	0.3148	0.3122	0.3508	0.3428	0.2715	0.2534
	6	0.3060	0.2849	0.3272	0.2981	0.2587	0.2171
62770	1						
	2						
	3	0.2336	0.2185	0.2719	0.2721	0.2446	0.2294
	4	0.2603	0.2601	0.2926	0.2900	0.2325	0.2441
	5	0.3245	0.3221	0.3654	0.3574	0.2732	0.2570
	6	0.3201	0.3001	0.3287	0.3173	0.2494	0.2204
62970	1						
	2						
	3	0.2272	0.2151	0.2674	0.2719	0.2494	0.2265
	4	0.2594	0.2569	0.2885	0.2884	0.2440	0.2360
	5	0.3182	0.3229	0.3476	0.3697	0.2706	0.2533
	6	0.3072	0.2933	0.3302	0.3264	0.2548	0.2161

DATE	DEPTH	1	2	3	4	5	6
70170	1						
	2						
	3	0.2208	0.2085	0.2671	0.2636	0.2383	0.2124
	4	0.2513	0.2529	0.2820	0.2775	0.2322	0.2245
	5	0.3144	0.3181	0.3419	0.3515	0.2580	0.2386
	6	0.2902	0.2908	0.3276	0.3114	0.2445	0.2036
70370	1						
	2						
	3	0.2441	0.2285	0.2792	0.2796	0.2565	0.2366
	4	0.2618	0.2572	0.2888	0.2830	0.2460	0.2456
	5	0.3230	0.3186	0.3524	0.3725	0.2800	0.2687
	6	0.3169	0.2996	0.3185	0.3157	0.2478	0.2319
70570	1						
	2						
	3	0.2388	0.2293	0.2766	0.2777	0.2555	0.2313
	4	0.2631	0.2645	0.2950	0.2949	0.2331	0.2453
	5	0.3266	0.3245	0.3648	0.3649	0.2756	0.2672
	6	0.3228	0.3096	0.3257	0.3110	0.2471	0.2331
70770	1						
	2						
	3	0.2228	0.2235	0.2696	0.2772	0.2523	0.2262
	4	0.2539	0.2617	0.2895	0.2942	0.2393	0.2411
	5	0.3162	0.3262	0.3631	0.3695	0.2661	0.2558
	6	0.3107	0.3042	0.3293	0.3183	0.2471	0.2197
71070	1						
	2						
	3	0.2727	0.3315	0.3516	0.3612	0.3559	0.3885
	4	0.3607	0.3558	0.3424	0.3613	0.3750	0.3116
	5	0.4195	0.3927	0.3550	0.3401	0.2825	0.2791
	6	0.3781	0.3388	0.3228	0.3076	0.2556	0.2410
71170	1						
	2						
	3	0.2460	0.2462	0.3003	0.3211	0.3641	0.3838
	4	0.2708	0.3232	0.3483	0.3796	0.3813	0.3175
	5	0.4030	0.3847	0.3645	0.3255	0.2860	0.2808
	6	0.3390	0.3283	0.3239	0.2986	0.2552	0.2411
71370	1						
	2						
	3	0.2374	0.2324	0.2785	0.2833	0.2718	0.2569
	4	0.2628	0.2644	0.2982	0.3598	0.3652	0.3040
	5	0.3295	0.3375	0.3668	0.3286	0.2854	0.2783
	6	0.3277	0.3249	0.3244	0.3030	0.2573	0.2358
71770	1						
	2						
	3	0.2210	0.2193	0.2674	0.2769	0.2606	0.2346
	4	0.2537	0.2642	0.2875	0.3255	0.2399	0.2517
	5	0.3152	0.3306	0.3500	0.3153	0.2796	0.2759
	6	0.3110	0.3165	0.3142	0.2921	0.2508	0.2411

DATE	DEPTH	1	2	3	4	5	6
71970	1						
	2						
	3	0.2059	0.2147	0.2668	0.2783	0.2510	0.2314
	4	0.2450	0.2604	0.2879	0.3212	0.2378	0.2464
	5	0.3096	0.3259	0.3456	0.3160	0.2673	0.2626
	6	0.3002	0.3035	0.3198	0.2866	0.2507	0.2351
72170	1						
	2						
	3	0.2344	0.2221	0.2723	0.2808	0.2603	0.2376
	4	0.2572	0.2596	0.2889	0.3271	0.2409	0.2535
	5	0.3228	0.3256	0.3560	0.3203	0.2709	0.2735
	6	0.3180	0.2932	0.3257	0.2941	0.2504	0.2438
72370	1						
	2						
	3	0.2201	0.2189	0.2683	0.2795	0.2610	0.2330
	4	0.2506	0.2611	0.2894	0.3268	0.2441	0.2489
	5	0.3195	0.3287	0.3537	0.3256	0.2726	0.2579
	6	0.3002	0.2975	0.3270	0.2973	0.2504	0.2325
72570	1						
	2						
	3	0.2192	0.2270	0.2811	0.2829	0.2587	0.2376
	4	0.2495	0.2562	0.3026	0.3059	0.2607	0.2682
	5	0.3240	0.3118	0.2864	0.3500	0.2698	0.2532
	6	0.3006	0.3177	0.3332	0.3122	0.2389	0.2393
72770	1						
	2						
	3	0.2080	0.2077	0.2613	0.2681	0.2503	0.2173
	4	0.2435	0.2513	0.2802	0.2982	0.2436	0.2327
	5	0.3121	0.3212	0.3447	0.3135	0.2730	0.2409
	6	0.2835	0.2865	0.3197	0.2850	0.2527	0.2152
72970	1						
	2						
	3	0.2015	0.1988	0.2632	0.2651	0.2419	0.2202
	4	0.2433	0.2514	0.2876	0.2952	0.2412	0.2296
	5	0.3174	0.3211	0.3590	0.3158	0.2761	0.2523
	6	0.2931	0.2884	0.3290	0.2873	0.2515	0.2111
73170	1						
	2						
	3	0.1955	0.1951	0.2581	0.2658	0.2361	0.2162
	4	0.2435	0.2489	0.2830	0.2951	0.2328	0.2310
	5	0.3095	0.3188	0.3530	0.3209	0.2676	0.2464
	6	0.2899	0.2915	0.3281	0.2916	0.2455	0.2109
80270	1						
	2						
	3	0.1868	0.1988	0.2673	0.2684	0.2385	0.2297
	4	0.2315	0.2470	0.2927	0.3026	0.2342	0.2579
	5	0.3018	0.3204	0.3407	0.3156	0.2551	0.2194
	6	0.2679	0.2855	0.2996	0.2851	0.2283	0.2133

DATE	DEPTH	1	2	3	4	5	6
80470	1						
	2						
	3	0.1934	0.1909	0.2578	0.2693	0.2292	0.2116
	4	0.2420	0.2458	0.2818	0.2985	0.2291	0.2325
	5	0.3143	0.3220	0.3455	0.3242	0.2716	0.2486
	6	0.2903	0.2945	0.3301	0.3013	0.2457	0.2136
80670	1						
	2						
	3	0.1852	0.1893	0.2552	0.2593	0.2244	0.2046
	4	0.2366	0.2528	0.2801	0.2941	0.2261	0.2256
	5	0.3061	0.3234	0.3471	0.3111	0.2689	0.2480
	6	0.2844	0.2982	0.3295	0.2988	0.2451	0.2138
80870	1						
	2						
	3	0.1952	0.1870	0.2524	0.2500	0.2211	0.2040
	4	0.2471	0.2463	0.2769	0.2906	0.2245	0.2239
	5	0.3156	0.3190	0.3422	0.3017	0.2676	0.2487
	6	0.2987	0.2915	0.3289	0.2952	0.2444	0.2120
81070	1						
	2						
	3	0.1837	0.1905	0.2484	0.2466	0.2175	0.1916
	4	0.2347	0.2460	0.2669	0.2868	0.2218	0.2109
	5	0.3040	0.3222	0.3295	0.2911	0.2623	0.2424
	6	0.2795	0.2918	0.3200	0.2908	0.2419	0.2068
81270	1						
	2						
	3	0.1784	0.1794	0.2431	0.2398	0.2097	0.1846
	4	0.2317	0.2400	0.2659	0.2837	0.2199	0.2010
	5	0.3008	0.3112	0.3366	0.2794	0.2575	0.2433
	6	0.2715	0.2842	0.3258	0.2884	0.2393	0.2043
81470	1						
	2						
	3	0.1762	0.1772	0.2453	0.2356	0.2037	0.1876
	4	0.2359	0.2464	0.2637	0.2800	0.2197	0.2039
	5	0.3030	0.3140	0.3271	0.2723	0.2549	0.2349
	6	0.2835	0.2853	0.3172	0.2914	0.2382	0.2016
81670	1						
	2						
	3	0.1642	0.1724	0.2391	0.2292	0.2068	0.1835
	4	0.2283	0.2404	0.2631	0.2693	0.2247	0.2035
	5	0.2942	0.3142	0.3314	0.2681	0.2616	0.2367
	6	0.2729	0.2875	0.3200	0.2842	0.2436	0.2017
81870	1						
	2						
	3	0.1603	0.1639	0.2356	0.2286	0.2066	0.1823
	4	0.2288	0.2373	0.2577	0.2708	0.2249	0.2014
	5	0.2990	0.3108	0.3231	0.2747	0.2614	0.2339
	6	0.2743	0.2829	0.3131	0.2882	0.2420	0.2019

DATE	DEPTH	1	2	3	4	5	6
82070	1						
	2						
	3	0.1565	0.1651	0.2345	0.2270	0.2075	0.1821
	4	0.2298	0.2422	0.2611	0.2700	0.2267	0.2031
	5	0.2945	0.3129	0.3342	0.2679	0.2656	0.2405
	6	0.2769	0.2862	0.3210	0.2879	0.2474	0.2057
82270	1						
	2						
	3	0.1601	0.1733	0.2472	0.2278	0.2043	0.1793
	4	0.2327	0.2499	0.2746	0.2714	0.2199	0.2006
	5	0.3021	0.3254	0.3472	0.2748	0.2631	0.2415
	6	0.2803	0.2962	0.3356	0.2925	0.2435	0.2065
82470	1						
	2						
	3	0.1948	0.1771	0.2602	0.2535	0.2261	0.2039
	4	0.2395	0.2443	0.2683	0.2798	0.2245	0.2136
	5	0.3087	0.3167	0.3379	0.2788	0.2656	0.2380
	6	0.3118	0.2909	0.3301	0.2960	0.2444	0.2048
82670	1						
	2						
	3	0.1822	0.1780	0.2501	0.2430	0.2156	0.1990
	4	0.2266	0.2399	0.2621	0.2728	0.2145	0.2090
	5	0.3004	0.3144	0.3215	0.2698	0.2536	0.2356
	6	0.2746	0.2896	0.3156	0.2908	0.2375	0.2026
82870	1						
	2						
	3	0.1861	0.1737	0.2503	0.2439	0.2155	0.1959
	4	0.2337	0.2383	0.2672	0.2730	0.2232	0.2067
	5	0.2997	0.3070	0.3314	0.2708	0.2597	0.2377
	6	0.2805	0.2802	0.3214	0.2900	0.2351	0.2004
83070	1						
	2						
	3	0.1768	0.1672	0.2407	0.2331	0.2161	0.1908
	4	0.2337	0.2397	0.2556	0.2723	0.2228	0.2102
	5	0.2978	0.3116	0.3193	0.2686	0.2604	0.2439
	6	0.2740	0.2828	0.3108	0.2873	0.2346	0.2033
90170	1						
	2						
	3	0.1786	0.1656	0.2459	0.2382	0.2157	0.1920
	4	0.2319	0.2372	0.2637	0.2753	0.2197	0.2096
	5	0.3010	0.3074	0.3305	0.2708	0.2635	0.2429
	6	0.2845	0.2742	0.3122	0.2915	0.2408	0.2036
90570	1						
	2						
	3	0.1692	0.1628	0.2404	0.2308	0.2150	0.1854
	4	0.2256	0.2347	0.2559	0.2707	0.2211	0.1764
	5	0.2946	0.3060	0.3231	0.2649	0.2637	0.2377
	6	0.2708	0.2785	0.3107	0.2882	0.2386	0.2020

APPENDIX 7. Soil water pressure

MATRIC SUCTION (CM),PSI

DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
80569	1						
	2	-18	-31	2	-8	-26	*****
	3	-10	-6	16	0	4	12
	4	3	14	43	34	18	46
	5	24	24	45	50	45	64
	6						
80769	1						
	2	-40	-62	-9	-46	-65	-20
	3	-35	-31	-1	-34	-27	-6
	4	-18	-10	28	-4	-13	27
	5	4	1	35	20	21	44
	6						
80969	1						
	2	*****	-102	-28	-82	-131	-33
	3	-56	-48	-17	-48	-38	-21
	4	-29	-19	9	-11	-20	15
	5	-17	-12	22	12	11	28
	6						
81169	1						
	2	*****	-89	-40	-77	-114	-49
	3	-58	-48	-23	-55	-42	-34
	4	-38	-27	0	-14	-25	-5
	5	-12	-17	17	11	4	19
	6						
81369	1						
	2	*****	-288	-69	-176	-319	-125
	3	-112	-79	-42	-76	-52	-49
	4	-55	-36	-14	-18	-32	-16
	5	-21	-26	0	-58	-7	9
	6						
81569	1						
	2	-328	-690	-163	-186	-582	-285
	3	-230	-166	-76	-130	-72	-82
	4	-97	-57	-24	-27	-43	-26
	5	-31	-39	-15	-60	-16	-1
	6						
81769	1						
	2	-674	-839	-216	-88	-617	-375
	3	-323	-259	-116	-154	-91	-122
	4	-124	-85	-29	-32	-56	-37
	5	-39	-49	-28	-61	-19	-8
	6						
81969	1						
	2	-320	-126	-88	-82	-390	-126
	3	-150	-242	-64	-108	-77	-46
	4	-168	-127	-25	-19	-54	-28
	5	-44	-68	-23	-57	-20	5
	6						

DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
82169	1						
	2	-185	-212	-67	-103	-316	-149
	3	-112	-148	-42	-90	-72	-47
	4	-134	-121	-23	-19	-49	-25
	5	-52	-86	-11	-60	-24	-3
	6						
82369	1						
	2	-296	-509	-154	-70	-674	-398
	3	-190	-200	-68	-140	-100	-86
	4	-138	-129	-29	-24	-61	-36
	5	-54	-87	-10	-60	-28	-8
	6						
82569	1						
	2	-328	-799	-327	*****	-820	*****
	3	-326	-312	-122	-230	-149	-101
	4	-182	-95	-41	-43	-88	-55
	5	-61	-102	-24	-66	-31	-21
	6						
82769	1						
	2	*****	-860	-607	*****	-772	*****
	3	-514	-456	-211	-333	-225	-287
	4	-255	-149	-57	-72	-139	-99
	5	-84	-130	-46	6	-38	-28
	6						
82969	1						
	2	*****	-840	-689	*****	-836	-232
	3	-670	-610	-329	-451	-343	-180
	4	-358	*****	-89	-126	-225	-173
	5	-111	-173	-79	*****	-46	-33
	6						
83169	1						
	2	*****	-837	*****	*****	-642	*****
	3	-764	-723	-441	-531	-436	*****
	4	-437	*****	-130	-180	-308	-249
	5	-145	-224	-123	-14	-55	-39
	6						
90269	1						
	2	*****	-795	-712	*****	-578	*****
	3	-783	-784	-510	-649	-642	*****
	4	-590	*****	-199	-262	-428	-362
	5	-204	-305	-201	*****	-77	-52
	6						
90469	1						
	2	-20	-34	-24	-20	-30	-28
	3	-8	-14	-13	-128	-244	-52
	4	-154	-73	-3	-78	-186	-110
	5	-198	-196	32	0	-73	-30
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DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
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	3	-29	-30	-26	-41	-76	0
	4	-40	-20	-12	-23	-81	-68
	5	-83	-48	24	3	-68	-32
	6						
90969	1						
	2	-38	-50	-18	-32	-48	-54
	3	-28	-26	-6	8	2	*****
	4	-6	*****	17	10	-19	0
	5	4	2	40	34	-2	12
	6						
91069	1						
	2	-69	-74	-36	-56	-90	-84
	3	-40	-38	-18	-10	-6	-40
	4	-14	-5	3	-4	-18	-9
	5	2	-4	28	28	2	13
	6						
91269	1						
	2	-160	-184	-76	-104	-258	-222
	3	-68	-58	-37	-30	-16	-62
	4	-26	-21	-13	-14	-25	-21
	5	-6	-14	12	20	-8	4
	6						
91469	1						
	2	-325	-468	-206	-78	-598	-515
	3	-132	-97	-59	-62	-32	-108
	4	-43	-32	-24	-21	-32	-31
	5	-17	-22	-5	18	-16	-4
	6						
91669	1						
	2	-267	-634	-348	-80	-724	-680
	3	-218	-150	-98	-102	-38	-76
	4	-56	-43	-31	-28	-42	-44
	5	-14	-30	-17	16	-22	-19
	6						
91869	1						
	2	-218	-230	-154	-96	-438	-388
	3	-232	-198	-110	-134	-52	-236
	4	-82	-67	-43	-36	-56	-66
	5	-34	-40	-34	14	-26	-28
	6						
92069	1						
	2	-308	-600	-341	-124	-548	-610
	3	-330	-354	-153	-149	-50	-282
	4	-114	-94	-53	-41	-67	-94
	5	-44	-50	-47	11	-27	-33
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DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
92269	1						
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	3	-514	-376	-251	-232	-144	-304
	4	-168	-138	-73	-58	-92	-140
	5	-54	-68	-72	8	-32	-40
	6						
92469	1						
	2	*****	-836	-782	*****	-808	*****
	3	-610	-502	-358	-292	-186	-426
	4	-242	-199	-100	-38	-120	-190
	5	-80	-95	-112	8	-36	-46
	6						
92669	1						
	2	*****	-826	-842	*****	-833	-282
	3	-632	-597	-455	-313	-244	-94
	4	-281	-208	-133	-34	-158	-126
	5	-106	-134	-169	6	-41	-56
	6						
92869	1						
	2	*****	-866	-845	*****	-844	*****
	3	-739	-714	-538	-371	-283	*****
	4	-406	-352	-187	-107	-197	-315
	5	-148	-197	-250	-1	-49	-74
	6						
93069	1						
	2	*****	-798	-850	*****	-844	*****
	3	-778	-768	-630	-408	-342	*****
	4	-540	-319	-229	-32	-243	-384
	5	-186	-260	-322	-5	-63	-88
	6						
100369	1						
	2	-24	-38	-43	-24	-30	-48
	3	-88	-644	-48	-165	-229	-298
	4	-384	-389	-173	-106	-194	-246
	5	-260	-322	-248	-1	-82	-72
	6						
100469	1						
	2	-56	-66	-56	-39	-74	-131
	3	-107	-215	-57	-88	-185	-186
	4	-325	-216	-135	-76	-133	-222
	5	-245	-302	-223	-2	-80	-95
	6						
100669	1						
	2	-280	-303	-226	-150	-324	-464
	3	-262	-240	-116	-94	-162	-151
	4	-316	-180	-103	-52	-101	-185
	5	-222	-253	-160	-4	-86	-102
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DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
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	3	-346	-287	-158	-104	-149	-248
	4	-301	-217	-103	-52	-98	-179
	5	-216	-232	-146	-3	-80	-102
	6						
101069	1						
	2	-598	-646	-497	*****	-588	-572
	3	-458	-383	-232	-146	-172	-314
	4	-381	-89	-129	-60	-107	-214
	5	-237	-256	-180	-6	-83	-110
	6						
101269	1						
	2	-760	-810	-622	*****	-657	-842
	3	-550	-492	-324	-186	-194	-230
	4	-406	-81	-163	-75	-122	-248
	5	-260	-290	-226	-6	-84	-121
	6						
101469	1						
	2	*****	-842	-830	*****	-830	*****
	3	-722	-630	-450	-258	-267	-350
	4	-506	*****	-209	-99	-150	-320
	5	-300	-344	-298	-7	-94	-136
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MATRIC SUCTION (CM),PSI

DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
61570	1						
	2	-318	-312	-204	-142	-212	-294
	3	-160	-270	-114	-60	-104	-192
	4	-122	-244	-38	-36	-42	-96
	5	-78	-130	-22	20	-24	50
	6						
61770	1						
	2	-114	-222	-76	-66	-130	-134
	3	-130	-248	-82	-50	-96	-156
	4	-140	-274	-46	-48	-12	-112
	5	-96	-152	-22	18	-28	16
	6						
61970	1						
	2	-26	-4	-22	-26	-20	-26
	3	-8	-6	-16	-22	4	-26
	4	-18	-90	0	-16	-6	0
	5	-8	-14	-2	36	24	78
	6						
62170	1						
	2	-84	-78	-62	-62	-48	-64
	3	-28	-26	-34	-28	-32	-44
	4	-42	-106	-10	-22	-20	-14
	5	-14	-20	-8	28	14	78
	6						
62370	1						
	2	-68	6	-54	-50	-48	-54
	3	-32	-16	-26	-28	-34	-44
	4	-46	-112	-12	-24	-22	-16
	5	-20	-22	-12	26	8	98
	6						
62570	1						
	2	-255	-209	-183	-132	-149	-163
	3	-86	-53	-54	-43	-65	-77
	4	-55	-118	-18	-30	-30	-29
	5	-27	-127	-12	25	30	*****
	6						
62770	1						
	2	-22	-5	-16	-12	-20	-18
	3	-11	-120	-78	-44	-47	-64
	4	-19	-116	-24	-28	-30	-36
	5	-17	-22	-12	25	16	6
	6						
62970	1						
	2	-132	*****	-109	-77	-114	-114
	3	-81	-81	-63	-37	-67	-75
	4	-72	-136	-28	-30	-40	-35
	5	-43	-42	-18	24	33	14
	6						

DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
70170	1						
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	3	-201	-145	-127	-62	-128	-134
	4	-86	-146	-38	-40	-49	-58
	5	-49	-55	-18	19	-18	35
	6						
70370	1						
	2	-20	-4	-15	-19	-22	-23
	3	-9	-4	-9	-21	-16	-23
	4	-33	-89	5	-9	*****	3
	5	-14	-15	8	36	25	88
	6						
70570	1						
	2	-79	-80	-62	-53	-59	-52
	3	-31	-34	-30	-29	-28	-42
	4	-46	-107	-5	-19	-10	-11
	5	-16	-8	1	30	17	88
	6						
70770	1						
	2	-262	-204	-196	-126	-172	-176
	3	-84	-42	-66	-37	-114	-71
	4	-52	-118	-12	-22	-22	-26
	5	-23	-21	-4	28	9	69
	6						
71070	1						
	2	-2	16	6	13	-2	3
	3	8	12	17	16	7	4
	4	4	*****	44	23	37	34
	5	18	14	46	67	60	68
	6						
71170	1						
	2	-26	15	-13	-19	-3	3
	3	-4	5	7	-18	10	4
	4	-12	*****	24	-3	38	38
	5	2	6	26	46	67	68
	6						
71370	1						
	2	-97	-79	-44	-37	-16	-14
	3	-29	-19	-17	-27	4	-10
	4	-42	*****	1	-11	19	21
	5	-15	-17	8	33	42	57
	6						
71770	1						
	2	-148	-117	-78	-43	-27	-43
	3	-89	-52	-33	-30	-30	-37
	4	-63	*****	-11	-18	-22	-10
	5	-34	-32	-6	29	18	25
	6						

DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
71970	1						
	2	-370	-182	-321	-118	-188	-134
	3	-304	-122	-103	-37	-59	-64
	4	-85	-136	-16	-25	-19	-22
	5	-44	-45	-8	26	11	6
	6						
72170	1						
	2	-18	-10	-22	-22	-21	-24
	3	-72	-104	-43	-24	-21	-25
	4	-59	-161	-10	-12	-10	1
	5	-49	-45	-5	29	12	8
	6						
72370	1						
	2	-246	-184	-81	-66	-76	-74
	3	-227	-97	-63	-32	-42	-48
	4	-101	-170	-15	-24	-14	-17
	5	-63	-54	-9	26	7	6
	6						
72570	1						
	2	-364	-302	-168	-72	-82	-90
	3	-286	-150	-80	-38	-60	-64
	4	-120	-180	-20	-26	-22	-24
	5	-74	-60	-9	24	0	6
	6						
72770	1						
	2	-676	-581	-178	-179	-313	-288
	3	-481	-234	-128	-52	-127	-128
	4	-162	-269	-23	-32	-33	-46
	5	-95	-71	-12	20	-13	1
	6						
72970	1						
	2	-421	-401	-459	-197	-468	-392
	3	-684	-382	-188	-76	-217	-185
	4	-242	-333	-32	-38	-50	-72
	5	-131	-91	-14	16	-16	0
	6						
73170	1						
	2	-829	*****	-556	-260	-583	-507
	3	-734	-494	-258	-110	-336	-276
	4	-355	-454	-48	-54	-96	-139
	5	-196	-138	-16	7	-21	-5
	6						
80270	1						
	2	-422	*****	-436	-202	-430	-402
	3	-656	-534	-246	-94	-300	-244
	4	-362	-608	-50	-52	-122	-178
	5	-264	-180	-16	7	0	-5
	6						

DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
80470	1						
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	3	-668	-597	-272	-129	-414	-331
	4	-462	-667	-68	-67	-172	-230
	5	-351	-253	-17	1	-36	-11
	6						
80670	1						
	2	*****	*****	-692	-551	-642	-825
	3	-635	*****	-356	-227	-347	-488
	4	-458	-624	-111	-100	-36	-336
	5	-83	-171	-18	-5	-53	-18
	6						
80870	1						
	2	*****	*****	-774	-572	-701	-885
	3	-648	-453	-443	-294	-241	-603
	4	-494	-665	-146	-147	-155	-387
	5	-143	-329	-21	-10	-67	-22
	6						
81070	1						
	2	*****	*****	-801	-715	-718	-874
	3	-637	-399	-513	-390	-178	-739
	4	-521	-697	-225	-219	*****	-501
	5	-237	-375	-23	-19	-92	-34
	6						
81270	1						
	2	*****	*****	-784	-782	-660	-842
	3	-599	*****	*****	-497	*****	-785
	4	-523	*****	-271	-303	*****	-585
	5	*****	-372	-27	-32	*****	-51
	6						
81470	1						
	2	*****	*****	-785	-822	-692	*****
	3	-609	-515	-438	-599	*****	-783
	4	-563	-800	-309	-359	*****	-568
	5	*****	-411	-27	-45	*****	*****
	6						
81670	1						
	2	*****	*****	-766	-823	-670	*****
	3	-633	*****	*****	-633	*****	-755
	4	-573	*****	-386	-441	*****	-664
	5	*****	-479	-28	-47	*****	*****
	6						
81870	1						
	2	*****	*****	-742	-830	-652	-614
	3	-679	-504	-565	-699	*****	-742
	4	-659	-679	-428	-474	*****	-698
	5	*****	-61	-29	-47	*****	*****
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DATE	K	I=1	I=2	I=3	I=4	I=5	I=6
82070	1						
	2	-631	*****	-684	-778	*****	-848
	3	-608	-693	-488	-743	*****	-724
	4	*****	-566	-493	-566	*****	-702
	5	-241	-442	-28	-95	-223	-135
	6						
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	2	*****	*****	-827	-864	-433	*****
	3	-657	-684	-484	-766	*****	-622
	4	-555	-804	-536	-631	-459	-692
	5	-261	-723	-32	-131	-38	-47
	6						
82470	1						
	2	-96	-152	-32	-62	-142	-161
	3	-76	0	-93	-138	-16	-203
	4	-167	-429	-15	-33	*****	-259
	5	-106	-165	-26	-22	*****	-18
	6						
82670	1						
	2	-174	*****	-179	-347	-205	-512
	3	-324	-334	-166	-203	-235	-330
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	5	*****	-166	-30	-34	*****	*****
	6						
82870	1						
	2	*****	*****	-492	-505	-288	-694
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	5	-116	-78	-33	-51	-165	*****
	6						
83070	1						
	2	*****	*****	-707	-768	-367	*****
	3	-663	-291	-379	-458	*****	-641
	4	-438	-784	-263	-229	*****	-611
	5	*****	-214	-35	-78	-128	*****
	6						
90170	1						
	2	-203	*****	-401	-478	-249	-681
	3	-544	-405	-270	-387	*****	-509
	4	-365	-346	-239	-223	*****	-553
	5	*****	-304	-36	-89	-204	-26
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90570	1						
	2	*****	*****	-705	-784	-248	-834
	3	-689	-350	-267	-537	*****	-745
	4	-470	-812	-376	-407	*****	-735
	5	*****	-47	-42	-104	*****	-36
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